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The RIGHT HON. LORD GEORGE HAMILTON, M.P., in the Chair.

THE TELEPHOTOS: A NEW MEANS OF ELECTRICAL SIGNALLING, BY NIGHT AND DAY, FOR THE NAVAL, MILITARY, MERCHANT MARINE, LIGHT-HOUSE, AND LIFE-SAVING SERVICES. WITH PRACTICAL DEMONSTRATIONS OF ITS APPLICATION.

By Colonel G. E. GOURAUD, (late) United States Army.

The CHAIRMAN: I must, in the first place, thank the Council for having offered me the honour of presiding here to-day. My connection with the United Service Institution in the past has been purely of an administrative character, and therefore I am very thankful to those gentlemen who are upon the Council that they have enabled me, now that I have retired into private life, once more to renew my acquaintance with an Institution which when I was an official I took great interest in. We have met to hear a lecture from a distinguished soldier, Colonel Gouraud, who is well known in the United States, not only as an eminent scientist, but also as an officer of great gallantry, and who has, amongst other recognitions of his merit, received the Medal of Honour for conspicuous service. He is good enough to undertake to explain a new system of electrical signalling, which I am sure will be a matter of great interest to both military and naval officers, but especially to the latter. We must recollect that in these days the tendency is every year to increase the mobility of naval armaments and ships, and, consequently, it is of the very utmost importance, if that increased power of movement is to be utilized, that there should be the simplest and most effective system of signalling amongst the ships thus moving, and one which is specially available at night. I cannot express any opinion upon the merits of this system, because it is a matter which is beyond me, but I feel sure that all here present will give the most respectful attention and hearing to the distinguished lecturer, and that they will welcome him with that cordiality with which the soldiers and sailors of our Service always welcome an officer belonging to another Service, especially if he belongs to a race which is the same as our own, and speaks our own language. With these few preliminary observations, I beg to introduce to you Colonel Gouraud.

IN presuming to address an audience comprising so many distinguished members of Her Majesty's Services as compose the Royal

United Service Institution of Great Britain, who have honoured me by their presence here to-day, I feel that some apology is due; all the more so from the fact that I understand there are present many eminent, indeed representative experts of the various signal services, to which the subject of my lecture more directly appeals.

A long and somewhat conspicuous identification with kindred subjects from a scientific point of view, together with the fact that my participation in the military service of another country during a memorable war of several years' duration, which gave me many opportunities for both witnessing, as well as experiencing to my very direct personal advantage, the incalculable value of an efficient signal service, may perhaps in some degree excuse an otherwise unwarrantable presumption.

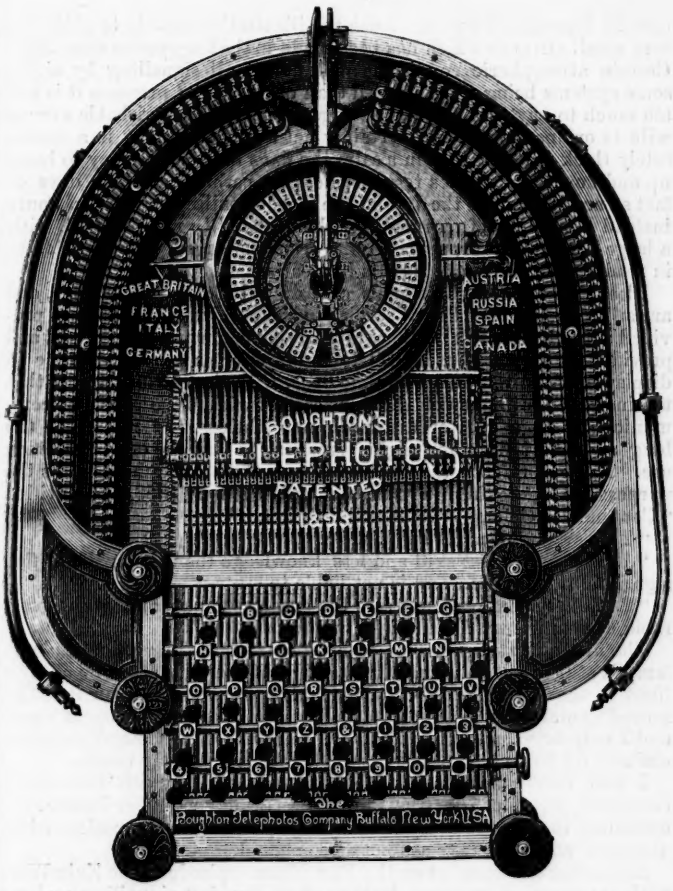
Having several times before had the honour of being invited to lecture in this Institution, but, unfortunately, always prevented by either absence abroad or illness, I have availed myself of this the first opportunity afforded; and am fortunate in having for my subject one not only in every way peculiarly appropriate to this place and company, but involving as it does an absolutely new invention which is now exhibited and described for the first time in any country. That it was not first shown in the United States is perhaps remarkable, considering that it is the invention of an American, a circumstance, I am informed, which is due to the fact of the keen interest taken in the invention by a well known British naval officer of great experience, who chanced to see the apparatus at the moment of its completion, and who so strongly advised its inventor to lose no time in bringing it to the notice of the British authorities, that he resolved to do so at once. It is alike to that same British officer that I am myself indebted for the pleasure and advantage of having made the acquaintance, only since his arrival in England, of a fellow-countryman whom I have found to possess, besides many high qualities of character, the gift of inventive genius of a remarkable order.

With these prefatory remarks, I have only to crave your kind indulgence, which I do with a confidence begotten of a long and happy residence in a land we are proud to think of as our mother country.

The Telephotos.

(The invention of Mr. Claudius Victor Boughton, of Buffalo, N.Y.)

A new means of electrical signalling by night and day, for naval, military, merchant marine, lighthouse, and life-saving services. Its theory and construction, with demonstrations of its application. For the better appreciation of the advance in the science of signalling which is claimed for this invention, it may be convenient, more especially for those of my hearers who are not experts in this special branch of the Services, if I touch briefly upon the three most rapid and reliable systems now in use, namely, the flags and heliograph for



day, and the Colomb signals by night, conceding at once both their rapidity and accuracy, and then indicate the particulars in which they fall short of what is required, leaving you to determine in the end whether I am right in the opinion I have formed that Mr. Boughton's invention fills an important gap.

Signalling by flags has not made any remarkable progress since the day of the historic signal "Engage the enemy more closely;" "England expects every man will do his duty," which was displayed with 33 flags in 13 hoists from Nelson's flagship, the "Victory," at Trafalgar, while if the same signal had to be made to-day, it would

take 25 flags and 9 hoists. I use the illustration merely to point the very small advance which has been made in the flag system since 1805. Certain atmospheric conditions will defeat all signalling by sight, some systems being more affected than others, but I presume it is not too much to say that colours of flags are not distinguishable over a mile in ordinary haze, and certainly not at that distance in a moderately thick fog, and that in a calm the flags have a tendency to hang up and down for minutes together, less so perhaps in these days of fast steaming than in the days of the wooden sailing ship, when hours instead of minutes often ruled, yet the probability remains that, with a large fleet at anchor, ships 2 miles from the flagship have difficulty in reading the Admiral's signals in a calm.

I learn that the night signals of Admiral Colomb have done, and are still doing, most efficient service in some ships which are not provided with electricity, and that ships having command of a current and provided with mast-head electric lights effect a saving of time in displaying Admiral Colomb's time flash, with the obvious result that the increased brilliancy of the light carries with it the power of communicating to a greater distance; nevertheless, the system of the long and short flash for night signalling is still the one in common use. I do not refer to the occasional use of the search light for the purpose. I quote from a pamphlet published in 1866, and entitled "Commander Colomb's Patent Night Signals":—

"This system of night signals, &c.

"1. It requires less skill and less knowledge than the ordinary flag signals in the daytime, and is not liable to error.

"2. This system possesses also the greatest range, and is the most rapid system known for daylight and fog signals."

The first quotation is endorsed by the fact that the original Colomb lamp is still in use in many ships, and that the time flash by electric light is the only improvement which has been made upon it. The second quotation I am not in a position to offer any comment upon, and I only introduce it to emphasize the advance on Colomb's system claimed for this new invention, which I shall presently reach.

I will now touch upon the heliograph, which, with the sun at command, is, of course, the most powerful day signaller known, far exceeding in distance every other system; but obviously useless when the sun's uncertain rays are not at command.

Reflect for one moment on the Fort Ekowe episode of the Zulu War, with its piece of common looking-glass for day signalling and no available means, beyond a common lamp, of communicating by night, and consider the similar incidents other wars have furnished in the past and will doubtless furnish in the future.

I could point, of my own experience, to several instances of like failure during the American War of the Rebellion.

The theory of the telephotos is the production by electricity upon a shaft of incandescent lamps of any candle power, of the symbols of the Morse alphabet and numerals, in dashes of 5 ft. length, made with 10 lighted lamps, and dots of 3 in., made with one lighted lamp, and with unlighted intervals of 5 ft. between each, which will bring under

the eye the complete symbol at once, and is intended for use at any points within vision between which the laying of telegraph wires is impossible or impracticable.

Its Construction.—The Telephotos is a combination of electrical connections contained in a case mounted on a pedestal which is fastened to the floor, having a key-board of the alphabet and numerals, the same as that of a type-writing machine, and the keys have raised on their under side all the Morse characters in brass, with platinum points; the cross bars, 106 in number, are flexible and embedded in hard rubber. A groove under the keys contains a number of fine steel bicycle balls, with $\frac{1}{16}$ in. of lost motion, which is the thickness of a key, so that, when that space is occupied by pressing one key down between the balls, all other keys are locked. The key, when pressed down, contacts with and conveys the current to the cross-bar by means of the raised symbol on the under-side of the key, from which cross-bar wires lead to the lamps on the light frame, which, when lighted, make the Morse character corresponding to that on the key pressed down. The switch-board is 11 in. by 14 in., and has a capacity of controlling perfectly 106 incandescent lamps, and I think I am safe in saying that so many lamps have never before been controlled in so small a space. The lamp is one of an entirely new design, representing in shape a round door-knob, with a filament of 10 coils placed cross-wise, in order to secure the greatest light surface of the lamp; each lamp fits into a parabolic metal reflector, and the front of each is covered with a paralleling lens, designed at the Cornell University for this invention.

Here I must premise that, to make the entire Morse alphabet and numerals with separate lamps, 535 would be required, and would necessitate a shaft 270 ft. long; but the inventor, by an ingenious arrangement of his electrical connections, effects his object with 53 lamps in a shaft 27 ft. long by $3\frac{1}{2}$ in. by 3 in., and in so using the 53 lamps to perform the work of 535, you will observe that, as the current is cut off from a symbol, the greater portion of the lamps which formed it are instantly relighted to form the next symbol, and so, practically, the objection which might be suggested, that the expiring incandescence of the filament of the lamp takes time to disappear, must be considerably modified in regard to the Telephotos; as a matter of fact, which you will presently see, the symbols are clearly defined and instantly cut off, the expiring incandescence of the lamps not instantly relighted being rendered invisible by the paralleling lens placed before each lamp. The ordinary telegraph key requires 129 motions to complete alphabet and numerals, as against 38 motions on the Telephotos.

You have before you, in the raised Morse symbol upon the keys, and the arrangement which insures that only one key at a time can switch the current which lights in the lamp frame the necessary lamps for exhibiting complete the symbol of the key touched, the essence of Mr. Boughton's invention, and you will observe that not any lights in the frame, other than those forming the symbol displayed, can possibly be lighted.

I ask your attention for a moment to the ingenious device contained within the cylinder which surmounts the key-board. It consists of the type arms used in the ordinary type-writing machine, and 36 double magnets for throwing the Roman type of the symbol simultaneously with its display on the light frame, on to a paper ribbon in order to preserve an unmistakable record of all communications made by the Telephotos, which record, being under seal, the duly authorized alone can have access to, and a device is being fitted to an instrument now in course of manufacture which will record the date and time of day any communication is made. The casual observer may possibly consider that he is looking upon a maze of wires with complicated connections and consequent liability to derangement.

Although consisting of many parts, there are but very few that are movable, and their movement is of such a nature that failure is impossible, and wear and tear practically *nil*.

While the inventor has certainly aimed to accomplish his object within the smallest possible space, and has admirably succeeded, he has made no sacrifice of certainty in the operation of any part of his system. Indeed, as is the case with many marvels of science and invention with which we are familiar, so do I feel justified in describing the Telephotos in its entirety as simplicity itself.

The Application of the Invention.

The shaft is portable, and may be either one-faced, or four-faced, as desired, to be hoisted to any point, or, laid horizontally in any convenient position, or, along the signal yard; it can be permanently fitted on any line of available space on a ship's hull or starboard and port sides, and across the bow and stern parts, on a pole topmast swivelling around it, or, the topmast could be fitted with a four-faced shaft showing ahead, astern, or abeam. A single or four-faced shaft, arranged to elevate to the perpendicular or lower as expedient, can be fitted on a bridge, and can also be placed on the semaphore mast, lighthouses, and lightships, and, as these latter are brought into postal and telegraphic connection with the shore, the Telephotos will complete the circuit between coast protecting navies as well as incoming and outgoing freight and passenger ships and the telegraphic centres on land. Lightships which it may be found difficult to connect with the land by submarine cable will have the very best substitute in this invention.

A light horse wagon is designed, for military use and life-saving service with stranded ships, to carry a shaft of lights, dynamo, and engine; the shaft lies horizontally on the vehicle, and can be raised and signalled from in a few seconds; the total weight, when complete, not exceeding 1,000 lbs.

Without in the least decrying the importance of either the telegraph or telephone in field service, permit me to suggest that the Telephotos will accomplish what neither of these systems can, to wit, free communication along the coast between land and sea forces acting together. It can move side by side with an army in its strategic

changes of position, and within vision limits by day or night be doing good work long before wires can be laid to operate either telegraph or telephone.

I know that signalling has obtained a high point of efficiency in the military Service, and I have every reason to believe the same of the naval Service; still maritime incidents have not been wanting of late which emphazise the pressing need in marine signalling for the means of rapid interchange of orders, news, and opinions: one, an Atlantic liner, filled with passengers, lies disabled in mid-ocean, and passing ships only bring to port news of the fact without the faintest clue to its cause, and the public mind is racked with anxiety for days; another, a catastrophe, the memory of which will always abide with us, and which, though seemingly led to by more than one contributory cause, nevertheless points clearly enough to the fact that in marine signalling there is great room for means whereby free, rapid, and unambiguous expression can be given to vital doubts.

The application of the invention from the inventor's point of view has now to be demonstrated, and I would here observe that any practical illustration of its value for actual service would be an impossibility in its present situation. Any discussion, therefore, which may follow the reading of this paper must of a necessity be somewhat one-sided, for you are familiar with every signalling system in use, and with the merits and demerits of each respectively, but this invention has yet to be brought to practical test, and its result brought to light before any comparison can be instituted, and its full value can be appreciated.

Farther back I said I would presently refer to the quotation I made from the 1866 pamphlet of Admiral Colomb, in order to emphasize the apparent advance the Telephotos is upon the Admiral's system, which is acknowledged to be the very best for night service ever used, observing that what the pamphlet affirms as true of the system it sets forth must also be true of the Telephotos, and the advance the latter is upon the system of Admiral Colomb is that it exhibits by one pressure of the finger a complete symbol, and simultaneously makes a perfect record of it in Roman characters.

To dilate upon the superiority of the Telephotos as a night signaller over Admiral Colomb's system is not the object in view, but I hold the opinion, based upon a careful examination of the invention, that when it is given a trial it will speak for itself with an eloquence more persuasive than any within my command.

The lights at night will show as far as any other lights of equal power, but the use of the Cornell lens gives an increase of one-third in the distance; and Mr. Boughton informs me that at $2\frac{1}{2}$ miles in bright sunshine and clear blue sky the Telephotos has been read with the aid of an ordinary glass, while at night in ordinary conditions of atmosphere the same signals were distinctly read without a glass 6 miles. This experiment represents the greatest distance there has as yet been an opportunity to try it; but, from the experiments made, Mr. Boughton assures me that he is confident that under similar conditions with the aid of field glasses such as are

ordinarily used, the signals can be distinctly and reliably communicated a distance obviously sufficient for all practical naval requirements.

The only knowledge required is that of the Morse alphabet and numerals. Telegraph operators read the symbols in lights more rapidly than they do those of the ordinary telegraph, because the light symbol is presented to the eye complete, and the letters of the alphabet and numerals upon the keys sufficiently indicate their use.

Given an expert telegraph operator to read the symbols, and an equally quick typewriting clerk at the key-board, letters made and read per minute by the Telephotos must greatly exceed the number the telegraph could transmit in the same time. This will be readily understood by those familiar with telegraphy.

The wires connecting the "keys" and "lights" being practically unlimited as to length, the "lights" can be assigned to any point, and the "key-board" located at any distance from it; the intervening wires between them, wrapped with water-proofing, form a cable $\frac{5}{8}$ in. in diameter. A simple arrangement on the "key-board" by the turn of a thumbscrew, gives two changes for private signalling, and a third change for any cipher combination of which alphabet and numerals are capable is provided for.

This key-board can be adapted to any light symbol. The Morse is used by the inventor merely to exhibit the principle of the Telephotos, namely, that of showing a symbol in its entirety. I make bold to suggest that, had the Telephotos been on the bridge of the "Camperdown," it might have been the means of saving a million sterling, and of preserving the lives which went out with the "Victoria."

The invention as a whole, as presented for your consideration, I feel every justification in pronouncing to be one of exceptional merit both in its conception and execution. As I have already stated, the apparatus before you is now shown in public for the first time; it, therefore, goes without saying that it has not yet had the advantage of having been subjected to the crucial test of practical service at sea, and while there is in the mind of the inventor no reason to doubt that it will realize all his expectations, he, with characteristic modesty, anticipates that the criticisms and suggestions which will naturally emanate from the distinguished officers of Her Majesty's Service into whose hands it will naturally pass for trial may, perhaps, lead to some modifications of more or less importance. He desires me to add that he will thankfully receive all such suggestions in the confident belief that he can satisfactorily meet them.

In conclusion, permit me to submit the question this paper suggests to me—

Is the Telephotos an invention which, on trial, is likely to prove an important addition to the existing systems of signalling?

I have no doubt at least that the subject will receive all due consideration at the hands of the authorities of the various Services it concerns, and which must necessarily include an exhaustive practical test of its many applications.

To this end I understand Mr. Boughton is prepared to freely place both himself and his invention at your disposal.

There only remains to me to express to you, my Lord, in the name of both Mr. Boughton and myself, our very sincere thanks for the great honour you have done us in presiding at this meeting, and as well to you, gentlemen, for both the honour of your presence and the very kind attention you have accorded to my remarks.

I have the further pleasure of introducing Mr. Boughton, who will be both happy and able to supply my many deficiencies of description, together with the important supplement of such practical demonstration as the somewhat limited dimensions of this hall will permit.

Mr. BOUGHTON then gave a demonstration of the practical working of the Telephotos, explaining its details, and answering questions as to its adaptation to military and naval uses.

Admiral CLEVELAND: I speak with some diffidence on this subject, as I have not devoted very much attention to signalling; but it seems to me that this instrument, for exposing and occulting the light, is a similar application to that of my friend Admiral Colomb, when he introduced his flashing system some years ago. The only difference is, that this is an instrument for signalling *in form*, whereas Admiral Colomb's was for signalling *by motion*. All naval men will remember the kind of hurdy-gurdy box which Admiral Colomb introduced with his flashing signals—the application of the Morse system. This box was very soon discarded; it was found to be perfectly unnecessary, and the exposure and occultation of the light was effected entirely by hand. As far as I can understand, we want a light that will show *all round*, with which we can signal to any part of a fleet, and an electric light fixed at the mast-heads, exposed and occulted by an electro-magnet, actuated by a key in the conning tower, is the direction in which we ought to go, and, I believe, are at present looking. I am afraid that this instrument now before us, though beautifully made, is far too complicated for working on board ship. We want something very much more simple. I am very sorry to say anything against it, but I do not think that it is the thing we require for ship work.

Mr. QUAIN: I should like to ask whether it is the fact that the electrical lamp exhibited by Mr. Boughton is worked with the electro-magnet?

Mr. BOUGHTON: It is not. There is no incandescent lamp constructed with electro-magnets, that I know of.

Mr. QUAIN: It was mentioned that these lamps had the quality of electro-magnets?

Mr. BOUGHTON: This is not an electro-magnet lamp at all; this is a simple incandescent light. There is a magnet connected with this apparatus in recording. That is entirely cut off now from these lights, because six of the keys in the instrument are defective, owing to the breakage of the glass. The magnets are not connected. If you will look on the drawing, you will see that it is a simple incandescent light.

Admiral Sir VESEY HAMILTON: I am afraid that this is such a wonderful change in signalling—it is so different from our preconceived notions—that we are all really rather amazed at present, and unprepared for discussion, and as I hear that these lamps are to be put up on the Thames Embankment, I only regret that it has not been done before the lecture to-day, so that we might have seen something of the results of actual practice before discussing it. Speaking for myself, I came here perfectly ignorant on the matter, hoping to hear what some of our able signalling officers might have to say about it. For instance, my friend Admiral Colomb, I think, might give us some information which will be very interesting.

Admiral COLOMB: My Lords and gentlemen, I do not think it is quite fair to draw me. However, of course I respond. The instrument exhibited for actuating the lights and the way in which the light is displayed are perfect novelties to all

of us. We are introduced to a new set of ideas, we may say, and I think we might quite easily, with our preconceived notions, not see at first the whole plan which is opened to the inventor's mind. First of all, I think his aim must be rapidity. It is perfectly well known that with the flashing system, as it stands, we are eternally working for greater rapidity. The rapidity he has got; about 20 words a minute, 100 letters I think he said, happens to be the highest speed which my military colleague (Colonel Keyser), if I may call him so, who sits behind me, has got with the flashing system, and I hope that he will be "drawn" as soon as I have finished. They do in the army 20 words a minute—I have seen it myself—not slurred over, but done with absolute correctness, with corrections made, so that the message should come with perfect accuracy. 12 words a minute is their ordinary working speed. We have not got as far as that in the navy yet, because the apparatus which can be used with that speed for land service is not suitable for sea service, but it is perfectly certain, with the number of officers who are now engaged in the matter, that we shall ultimately get that greater speed. Then, I think, in this way the aim of the inventor in getting greater speed will be, or I am afraid is likely to be to some extent, frustrated by the greater rapidity which is being got gradually out of the flashing system. The system before us is one of signals by form almost alone. You must recollect that there are only three ways of making visible signals, either by difference of colour, by difference of form, or difference of motion; commonly, two or more of those three things are combined, as in the flag system. In this system there is a little colour used, just enough to make the distinction. The flashing system is wholly motion; it has nothing whatever to do with form or colour, but everything depends on comparison of the times in which the symbols are produced. The observer compares in his mind the difference of the time as they pass, and knows his signals accordingly. This is a new application of form by light signals. It is nearest to the system of which, I think, Sir Alexander Milne was the author. He had a series of lights placed vertically; they were, of course, not electric lights in those days, but they were white lights at different distances apart, making a similar sort of arrangement to that which we have before us now, supposing that line of light was vertical. When you get electricity, you can do an infinite number of things which you could not do before it existed, and the inventor has shown the greatest possible skill in his contrivance, and must have had, I am sure, any number of sleepless nights over it. He may be mistaken, from his want of practical knowledge of signalling, in the way in which he has applied it, but I can hardly help thinking that out of this may come modifications which will be found exceedingly useful. I am sure there is a great deal in these keys, and in the method of employing electricity, which is quite likely to be developed. There is a point we have to think of practically for the service of the fleet. I am bound to say I do not in the least agree with the officers who put it forward—but the officers who do so are possibly much better judges than I am—there is a certain demand in the navy for "standing signals" for the manœuvring of the fleet. I myself have seen a fleet manœuvred for months with the flashing system, and, knowing that all our fleets have been manœuvred for 25 or 30 years entirely with the flashing system, cannot lay much stress upon this demand; but many officers, Admiral Baird, for instance, a most practical officer, lay great stress upon the idea of having standing signals for manœuvring the fleet at night, and for nothing else. He proposed to use a line of vertical lights which might, by their colour and varying distance apart, form a standing signal which could be kept visible—not like the flashing system, a succession of signals, but like a series of flags—a standing signal which might be looked at as long as necessary by the fleet, and might be kept showing as long as it was desired. Now, if you take this system and put aside the idea of using the Morse, or the modified Morse, which the inventor has been using—if you take the instrument itself and think of the possible modifications there may be in the way of producing those standing signals which the navy has been working for, possibly something might be done with it. I know nothing whatever of Mr. Boughton; he was good enough to call upon me, and I am afraid I was excessively rough with him—not unduly rough I hope—because I was not in a position to listen to long explanations, and I had to gather the object of the inventor in a series of very short, sharp questions; but I am bound to say it struck me from his answers

that, barring the fact that he had no practical knowledge of signalling, he had the sort of mind which would be certain to come to right conclusions when he added the practical knowledge of signalling to his knowledge of electricity and to his great mechanical skill. I never saw the instrument before to-day, but I saw a photograph of it, and it struck me that there was great skill displayed in its construction. These are only thoughts that strike me at first. In all these cases I know only one way of going to work, unless the thing is absolutely absurd on the face of it, and that is to try it against existing systems, to see which way the wind blows, which way the land lies. That is the only way that I know of to get at the rights and wrongs of a question of this sort. I hope, my Lord, you will call upon my colleague behind me to carry on the discussion.

Colonel KEYSER, C.B. (Inspector of Signalling, Aldershot): I rise in obedience to the challenge of Admiral Colomb, though I do not think I have anything to say, but as representing the army signallers I wish to explain to the inventor that what we principally aim at is portability combined with simplicity, and at first sight this enormous mechanism rather takes one's breath away. I daresay when we come to know it better we shall see other points about it, and if we work together we may be able to adapt it in some way to our system: but so far as I can see at present I am afraid it is very much too cumbersome for any use in the field. I think for fixed stations, for forts, standing camps, or anywhere where we may be for four or five months at a time it may be very useful indeed. The great advantage would be that you would not have to focus your signal continually; everybody could see it without having to take the trouble of finding out the exact whereabouts of the people with whom you are going to signal, but beyond that I am very much afraid it would be of very little use to the army.

Mr. BOUGHTON: In reply to Admiral Colomb and to Colonel Keyser, I wish to say that I do not profess to be an expert in signalling. I am exhibiting a principle that can be modified in every way. I have had the question asked me since I came here, how long I have sailed. My reply was, when I crossed the gang-planks of the "Paris," to come to Europe, was the first time. I never up to that time saw a signal thrown.

Lord GEORGE HAMILTON (Chairman): Well, ladies and gentlemen, if nobody has any further observations to make or questions to put, I may discharge what I believe is the duty of the Chairman, and a very pleasant duty, on behalf of this meeting, to heartily thank Colonel Gouraud and Mr. Boughton for the lecture which they have been good enough to deliver, and for the very effective manner in which we have been shown by experiment and illustration the advantages of the invention which is brought before our notice. If the distinguished naval officers who are present, and also if those in the room who have a special knowledge of the training of signalling men are unable to express any very definite opinion on this invention, it is pretty clear that a poor layman like myself is hopelessly in the dark. I carried away with me from the navy certain ideas, and, those ideas being few, I am very tenacious of them. The one idea I got from my connection with the Admiralty was, the enormously increased power and the enormously increased mobility of ships of war: that means rapid concentration. Rapid concentration is not of much use unless that concentration enables successful co-operation and combination, and successful co-operation and combination can always be promoted and advanced by a simple and effective and rapid system of signalling. And therefore I think that anybody who is good enough to give his attention to this particular subject and to make various suggestions, no matter in what direction, which will tend to increase and accelerate the existing system and methods, confers a very considerable service not only upon the navy, but also upon the army. I am sure it is in that sense that we have all listened to this lecture. We hope that the criticisms and the observations that have been made will not be in any way considered discouraging, but, on the contrary, that they may have the effect of inducing both the gentlemen who have been here present to look at these objections from a practical point of view, and if they do so let us sincerely hope that they may be able so to overcome them as to make this instrument and this invention ultimately a means of benefit to both Services. I think you will perhaps allow me to convey to Colonel Gouraud and Mr. Boughton our very hearty thanks for

their goodness in being present here to-day and delivering the lecture to which we have all listened with so much pleasure.

General GEORGE ERSKINE: Ladies and gentlemen, we have listened to a very clear and interesting lecture, and we have seen experiments exhibited which have no doubt given a great deal of pleasure to all present, and a vote of thanks has been accorded to the lecturer, which is quite right. But we must not think that we can allow our Chairman to leave his post without being thanked for the very great trouble which he must have taken in coming here and presiding over the meeting on the present occasion. This Institution, I might be allowed to remark, owes a great deal to Lord George Hamilton in the past, and very probably in the future we shall owe him a great deal more. Therefore I think that our vote of thanks this evening should be very cordial indeed.

Admiral Sir VESEY HAMILTON: I have very much pleasure indeed in seconding the vote of thanks so ably proposed by the Chairman of this Institution, General Erskine, and I have the more pleasure in doing so from the fact that I was associated with Lord George Hamilton some part of the time when he ruled over the Queen's navy, a period which, I think all naval men will agree with me, may be described as the golden age of the navy.[1] Lord George Hamilton is particularly fitted to preside over this meeting. His knowledge of all the details of the Admiralty, not only the financial details but also of the scientific details such as we have before us, particularly qualifies him to preside over this meeting.

The resolution was carried by acclamation.

Lord GEORGE HAMILTON: I am exceedingly obliged to you. I was glad to be present to-day. I take great interest in this Institution. When I was at the Admiralty I fully recognised its utility and did my best to try and secure for it a rather more fitting habitation than that which it now occupies. I believe the results of those endeavours were successful. You are about to enter into a magnificent house, and I sincerely trust that when you get there you will be in the possession of an income adequate and suitable to maintain it.

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[1] In saying this I would observe I had nothing to do with the Naval Defence Act. But its principles and details were completely worked out before I went to the Admiralty.

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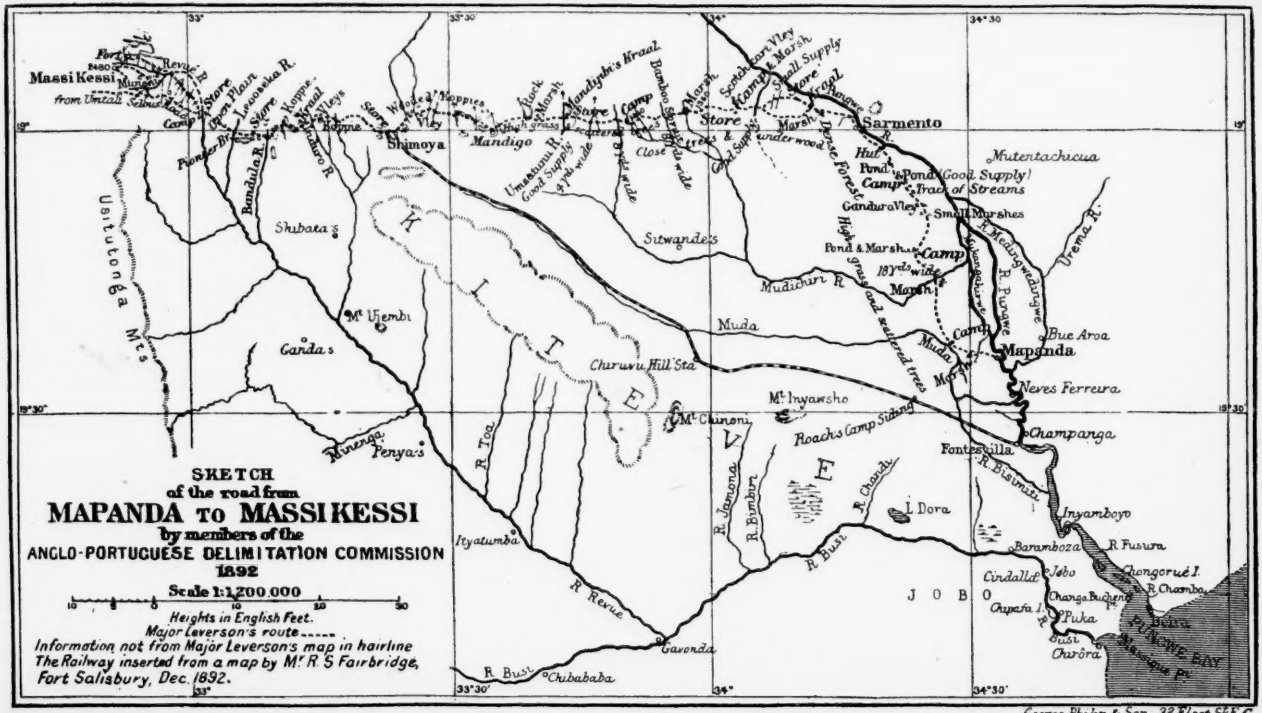
[*Plate* 6. *To face p.* 115.



George Philip & Son, 32 Fleet St. E.C.

OCCASIONAL PAPERS.

TRANSPORT, SUPPLY, AND EQUIPMENT OF THE BRITISH SECTION OF THE COMMISSION FOR THE DELIMITATION OF THE BRITISH AND PORTUGUESE SPHERES OF INFLUENCE IN EAST AFRICA, 1892.

By Major J. J. Leverson, R.E.

The line agreed to by Great Britain and Portugal as the boundary between their respective spheres of influence in East Africa, south of the Zambesi, is laid down in general terms in Article II of the Anglo-Portuguese Convention of the 11th June, 1891.

Starting from the Zambesi, near Zumbo, it runs due south till it meets latitude 16° S., and then follows a westerly direction as far as the point where the River Mazoé is intersected by longitude 33° E. There it turns sharply to the right, and continues generally in a southerly direction to the River Sabi, ascends that river from the point where it strikes it to its junction with the Lundi, and then runs about south-west in a straight line to the north-east corner of the Transvaal, which is situated at the junction of the Rivers Unvubu and Limpopo.

To determine accurately, and mark out on the ground, as much of the above line as time would permit was the object of the operations in the field of the Anglo-Portuguese Delimitation Commission in 1892. Both extremities of the line being situated in parts of the country very difficult of access, and the boundary in the neighbourhood of Massi-Kessi being the portion that pressed most for settlement, it was determined to make that place our headquarters and the starting point of the survey, and to work north and south from it.

The British section of the Commission consisted of myself as Commissioner, Captain S. C. N. Grant and Lieut. C. S. Wilson, R.E., Captain F. E. Lawrence, Rifle Brigade, Surgeon-Captain Rayner, Grenadier Guards, Mr. Saville (interpreter), and five non-commissioned officers of Royal Engineers (trained surveyors). After our arrival in Manica we were joined by the late Captain E. C. Chamley Turner and six troopers of the British South Africa Company's police, bringing up the total number of white men to be provided for, including one servant, to 19. The other servants consisted of a Cape boy, three Zulus from Natal (two of whom deserted on the way up from the coast), three Indians, and a number of locally-engaged natives.

Leaving Southampton on the 19th March, 1892, in the ss. "Moor," of the Union Line, we transhipped at Natal into a coasting steamer, and reached Beira, the port from which we were to proceed inland, on the 22nd April.

There our difficulties commenced, for the steamer on which we had been relying to tow barges containing our baggage and supplies up the Pungwé to Mapanda's, the highest point to which the river is navigable in the dry season, had ventured farther up stream during the inundations, and had been left high and dry when the waters subsided.

No other steamers suitable for our purpose being available, we had to have recourse to sailing-boats. It took several days to collect the seven which were found to be necessary to carry everything which was to be conveyed to Mapanda's. In addition to personal baggage and camp equipment, we had with us a large scientific outfit for the survey operations in connection with the delimitation, 286 cases (each case one man's load) of provisions, spirits, &c. (calculated to be sufficient to last 12 Europeans for from eight to nine months), a large number of bales of goods for barter, and 400 loads of rice. This rice was merely a first instalment of what was required for the supply of the porters. It was subsequently largely augmented by a further consignment from Beira, by purchases at Massi-Kessi and Umtali, and by barter with the natives living along our line of march from Massi-Kessi to the Sabi River.

Having despatched the last of the sailing-boats from Beira on the 26th April, I followed next day with Captain Grant in the cutter of H.M.S. "Racoon," towed by a small steam launch, by means of which I hoped to be able to render assistance to any of the sailing-boats which might have got stranded on the innumerable and constantly shifting sand-banks in the river. On arrival at Mapanda's, however, on the morning of the 28th, we found that all the boats had reached there without accident.

Owing to reports that native porters were very difficult to get in the country we were about to pass through, and also that those who were obtainable were unreliable, the Portuguese Government had kindly undertaken, at my request, to collect porters for our party in the Inhambane district. At Mapanda's 176 of these joined us. They were in parties varying in numbers from seven to about 35, each under an Induna or headman. Throughout the expedition, even when the Commission was split up into small sections, the porters were kept as far as possible under their own Indunas, who were held responsible for them both on the march and in camp.

In order to be able to identify the porters, each one was given a small tin disc with a number stamped on it, which he usually wore attached to a coloured cord round his neck. The Indunas received larger discs, of which they were very proud.

Up till the 1st May we were engaged in unloading the boats, drying some of the rice which had got wet during a storm on the journey up the river, stacking those stores which were to be left temporarily behind at Mapanda's, and in weighing and arranging in loads suitable

for carrier transport everything that we were to start with on our march up country.

We left Mapanda's on the afternoon of the 1st May, our marching-out strength being 12 Europeans, seven coloured servants, 165[1] porters, seven Indunas, and five riding ponies. Of the loads, 40 consisted of rice for issue to the porters after the three days' rations which each man at starting carried for himself, in addition to his load, had been exhausted. All loads were made up to weigh as nearly as possible 50 lbs. each. As a matter of fact, they varied from about 48 lbs. to 55 lbs.

The cooking-pots for the natives were carried by the Indunas, who did not, as a rule, carry any other loads.

On the evening of the 7th May we reached Mandigo's, about 92 miles from Mapanda's, the average daily march (taking the time occupied on the journey as 6½ days) being 14 miles. This we found was as much as we could get the porters to do; they were still new to the work, the weather was hot, and the dense, tall grass, 6 ft. to 10 ft. high, through which we had to force our way along the greater part of the route impeded progress very considerably.

Later on, when the men had become more accustomed to the loads, we were able to make somewhat longer daily marches, even in the mountainous portions of the country, and on a few occasions we did as much as 21, and even 22 miles a day.

The 8th May was a day of rest. On the 9th, the whole of the porters, except some few who were footsore, set out under Captain Lawrence to return to Mapanda's, and bring up fresh loads. We had not been able to purchase any food for the natives on the way up, and the 40 bags of rice with which we had started were rapidly diminishing. The daily ration for natives was 2 lbs. either of flour or meal, and a little salt when there was any to be had. In addition to this, they were given meat whenever any game was shot or a sick ox killed, but, except when we were able to distribute it in large quantities, meat was looked upon as an extra, and the rice ration was not reduced. The supply of meat was very irregular, and at times the men were two, and even three, weeks without any. They were not particular as to its quality or state when served out to them, and ate the flesh of an ox which had suffered from lung sickness or the bite of the tsetse fly with as much relish as if it had been that of a healthy one. Whenever they had a superabundance of meat, all that was not required for immediate consumption was made into biltong—flesh cut into long narrow strips and dried in the sun. The natives are fond of salt, but it is not looked upon as a necessary, and they did not complain when they did not get any. Chili peppers, which were frequently found growing wild, were a very favourite condiment, and used to be cooked with the rice. Water was the ordinary drink of the natives, though, whenever it was to be had, they used to get from the villages pombi—a kind of beer brewed from native grain.

[1] Including two spare porters without loads.

On the rations issued to them our porters did really good work, and throve well, all of them looking much healthier and stronger at the end of the seven months they were with us than when they first joined us. There was very little sickness amongst them, and no death.

It was almost an invariable rule to make two marches every day. Their length was naturally somewhat dependent on the intervals between the places where drinking water was obtainable. The average rate of progress of the caravan when on the move did not at first exceed two miles an hour, including short halts. Later on, when we had got the porters better in hand, and they had grown accustomed to carrying the loads, the average was increased to nearly 2½ miles an hour, and sometimes even that was exceeded.

The hour of starting in the morning varied slightly with the season of the year. In May we used to rise at dawn (about 5.45 A.M.), strike our camp, have coffee, and be on the move about 40 minutes after réveille had sounded. The mid-day halting place was reached usually between 10 A.M. and 11 A.M. We rested there till between 1 and 2 P.M., and then marched till about 5 P.M.

In July, in the mountainous districts of Manica, it was intensely cold (almost freezing) in the early morning, and the porters complained that the cold ground and grass stumps hurt their feet so much that we often waited till the sun was well up (between 8 and 8.30 A.M.) before starting. On these occasions the mid-day halt was reduced to one and a-half or two hours. In September, October, and November, when the weather had again become hot, we used to rise in the dark, so as to be able to start the moment it was sufficiently light to see our way, and reach our resting place by 9 A.M., as by that hour the rays of the sun had become excessively powerful. At this time of year, our departure in the afternoon was generally delayed till about 3 P.M., and we then marched till between 6 and 7 P.M.

On the 25th May, Captain Lawrence and the porters who had returned with him to Mapanda's rejoined us at Shimoya's, a point about 22 miles beyond Mandigo's on the road to Massi-Kessi, to which, in their absence, we had moved with the assistance of an ox-wagon sent from Umtali to meet us.

The experience gained in the preceding year (1891) had been to the effect that Mandigo's was outside the tsetse fly zone, but it has since been ascertained that animals are not safe from its ravages till Shimoya's is reached on the journey up country. Everyone of the 12 oxen employed by the Commission between Mandigo's and Shimoya's died within three weeks.

On starting from Mapanda's we had five riding ponies with us, which we had brought from Natal. Though they were all bathed every day with a so-called anti-fly solution, they began very soon to waste away, and within a very few weeks they all died, or became so emaciated and paralyzed that they had to be shot.

From Shimoya's there is a wagon road to Manica, made in the early part of 1892 under the direction of Mr. Selous, the well-known explorer and hunter. Making a wagon road in a newly opened-up dis-

trict of Africa consists merely in removing enough trees to allow a wagon to pass, corduroying swampy places, and cutting down the banks of the streams at the drifts so as to form ramps not too steep for wheeled traffic. Occasionally, if the stream is deep and narrow, and the banks are steep, a rough wooden bridge is thrown across.

On the afternoon of the 26th May we set out from Shimoya's to continue our journey up country, our baggage and stores being carried as follows :—About 5,000 lbs. in a Cape buck-wagon, 3,000 lbs. in a tent-wagon, and 40 loads by porters.

The remainder of the porters, about 105 in number, 15 having deserted, were at the same time despatched to Mapanda's for further supplies. This time they were sent in charge of their own Indunas, and were not accompanied by any Europeans.

We did not reach Massi-Kessi till the end of the morning march on the 30th May, though the distance from Shimoya's is only 44 miles, the average daily rate for the four days being only 11 miles. This exceedingly slow rate of progress was due entirely to the difficulties and delays in getting the wagons across some of the drifts at which the streams were crossed.

When Captain Lawrence returned to Mapanda's from Mandigo's he had found a good many natives arriving at the former place in search of employment, and, through their headmen, he had arranged for some of them to carry loads for us to Massi-Kessi. The usual agreement was 1*l.* sterling, or, if gold were not available, goods to the value of about 1*l.* 1*s.* to 1*l.* 5*s.* from the traders' stores at Mapanda's, and rice for the journey up for each load delivered at Massi-Kessi. These porters insisted on prepayment, but we found them most trustworthy, and throughout the expedition we never lost a single load.

On the 1st June we had already altogether about 450 loads at Massi-Kessi. These were subsequently supplemented by the loads brought up by our own (Inhambane) porters on their third journey from Mapanda's, and by loads brought up by further batches of porters engaged locally by Messrs. Robbert & Co., who had been appointed agents of the Commission at Mapanda's.

The total number of loads taken with us, or subsequently despatched, from Mapanda's was as shown in the table on p. 120.

At Massi-Kessi I was able to enter into contracts with some traders for the supply of a considerable quantity of native meal for issue to the porters in lieu of rice. In order to facilitate the transport arrangements, I was anxious that part of this should be delivered at various points on the route which the Commission was about to take on its journey south to the Sabi, but all the traders with one exception refused to deliver anywhere except at Massi-Kessi or Umtali, and the one who formed the exception, who had agreed to furnish a large quantity at Chimanimani, about 70 miles south of Massi-Kessi, failed utterly to carry out his contract.

The amount of meal or rice required for the daily consumption of the Inhambane porters, guides, and others attached to the Commission after our arrival at Massi-Kessi was about 7 loads.

	Loads.	
	Equipment and stores for Europeans.	Rice and salt for natives.
Taken with us at original start from Mapanda's	123	40
Taken by the Inhambane porters on their second journey	65	70
Taken by the Inhambane porters on their third journey	—	98
Carried by locally engaged porters, May to September	242	264
Total	430	472
	902	

No reliable information being obtainable about the country south of Massi-Kessi, I made a reconnaissance in June, accompanied by Captain Lawrence. On reaching the Chimanimani Pass, we heard that the country further to the south was more thickly inhabited, and it was reported that a considerable quantity of meal could be obtained, though it would probably take some time to collect. It was, therefore, decided that while I returned to Massi-Kessi, Captain Lawrence should remain behind with a few of the porters, with instructions to establish a depôt, and purchase what meal, goats, and poultry he could, in exchange for barter goods.

On the route between Mapanda's and Massi-Kessi, the natives preferred to be paid in gold or silver rupees, but those engaged in the less travelled regions further south had no idea of the value of money, and did not care for it, and would hardly accept payment except in goods. White cotton sheeting (limbo) is the staple article of barter, though in some places coloured cottons were asked for. Blankets also are much prized, and beads and brass wire in small quantities. Empty solid-drawn cartridge cases, which the natives convert into snuff-boxes and wear in their ears, were at one time useful, but the market soon became overstocked with them. Salt was greedily asked for everywhere, except along the Limpopo River, where there are saline earths from which salt is extracted by rough processes. Gunpowder would have commanded a very high price, but this we refused to sell.

The collection of meal at a depôt was a somewhat tedious and slow affair. After establishing our camp, we used to send out to the villages in the vicinity, to let the inhabitants know that we were anxious to purchase meal, &c., and that everything they brought in would be paid for at a fair value. It took some time to prepare the meal, as grain is usually stored in the native granaries underground, and the method of grinding is not very rapid, the

grain being first stamped in a wooden mortar, and then ground by hand between two stones. The meal when ready was invariably brought in by women in baskets or round dishes. They were generally accompanied by their husbands, but in some places as soon as they found that they had nothing to fear from us they used to come alone. The baskets of meal varied from 2 lbs. to 20 lbs., and as they belonged to different owners each had to be brought separately.

Meal purchased, but not required for consumption or issue to our porters at the depôts, was made up into loads suitable for transport. When empty rice sacks were not available, long cylindrical bags were made out of the bark of trees.

I got back to Massi-Kessi on the 25th June, and immediately commenced to despatch parties of porters with supplies for delivery to Captain Lawrence at Chimanimani. For this purpose, in addition to the Inhambane porters, natives whom we were able to collect in the neighbourhood of Massi-Kessi were employed. The price paid to the latter was 10*s.* per load from Massi-Kessi to Chimanimani. In the first instance, two Europeans were sent in charge of each party of natives, but when the route became better known they went under their own Indunas. Each head of a party was always given a way bill, showing the number of loads in his charge and their contents.

Having ascertained on the return march to Massi-Kessi that it would be possible to collect a small quantity of meal at Setchagwa's, a point about midway between Massi-Kessi and Chimanimani, a small trading station was established there in charge of two of the British South Africa Company's police. This enabled the parties to deliver their loads intact at Chimanimani, and to leave the bulk of the meal collected there available for operations further to the south. The detail of the working of the system was as follows:—Massi-Kessi to Chimanimani was from 5 to 5½ days' march for porters with loads. On leaving Massi-Kessi each man took with him, in addition to his load, 3 days' supplies for himself. These were probably consumed by the time he reached Setchagwa's. At the latter place he was given a 3 days' further supply, which with about another 3 days' rations, issued at Chimanimani, where one day was allowed for rest, brought him back to Setchagwa's, when he was given enough to carry him on to Massi-Kessi. The Indunas of parties of porters were always obliged to produce last ration certificates before food was issued to them at any depôts.

During my absence Captain Grant and Lieutenant Wilson had been engaged in survey operations in the neighbourhood of Massi-Kessi. On the 1st July they started to continue their work to the south, taking with them two non-commissioned officers of Royal Engineers. They were accompanied by about 50 porters carrying baggage, equipment, and instruments, as well as about three weeks' rations for the Europeans of the party, and 10 days' rations for the natives. It was arranged that further supplies for the natives were in the first instance to be obtained from the depôt at Setchagwa's, and that later on supplies, both for natives and Europeans, would be found

awaiting the party's arrival at Captain Lawrence's camp at Chimanimani.

On the 2nd July I started on a week's reconnaissance to the north, accompanied by Captain Turner, Dr. Rayner, and some of the Portuguese officers belonging to the Commission, leaving Mr. Saville (interpreter) at Massi-Kessi to superintend the further despatch of loads to Chimanimani.

On the 15th July, sufficient supplies for nearly four months' consumption having been sent forward, I again left Massi-Kessi for the south with the headquarters of the Commission. During our absence Corporal Lewis, R.E., remained behind in charge of the reserve stores of the Commission. We reached Captain Lawrence's camp at Chimanimani on the 20th, and on the 21st were joined there by Captain Grant's party.

On the 23rd I proceeded further to the south with Captain Lawrence and Mr. Saville, leaving Captain Turner and Dr. Rayner temporarily at Chimanimani, while Captain Grant and Lieutenant Wilson continued their survey operations.

Having discovered on the right bank of the Lusitu River, about 30 miles from Chimanimani, a site suitable for a depôt, situated in a district in which considerable supplies were obtainable, word was sent back to Captain Turner to arrange to send on all stores to the Lusitu River, and as soon as this was done to abandon the depôt at Chimanimani.

Arrangements were likewise made for shifting the depôt at Setchagwa's to Malanda's, a native village almost exactly midway between Massi-Kessi and the Lusitu.

As far as Malanda's we were eventually able to make use of carts for bringing meal and rice from Massi-Kessi, a road for this purpose being made by the Portuguese and ourselves. After the road had been completed (end of July), ox-carts were able to travel along it at the rate of 10 to 14 miles a day. Beyond Malanda's the country soon became so mountainous that it was necessary to give up all idea of further employment of wheeled transport.

On the 26th July, leaving Captain Lawrence to form the depôt on the Lusitu, I started on a reconnaissance to the south-west, accompanied by Mr. Saville. On the 30th we reached a group of kraals belonging to the Chief Mapungane, where it was decided to form another depôt. Next day, leaving Mr. Saville to collect supplies there, I returned to the Lusitu by a more direct route, arriving there on the 2nd August. On the 5th I again left the Lusitu, and reached Mapungane's again on the 8th.

Subsequently reconnaissances were made to the south and south-west, and depôts were established on the Inyamgamba, 37 miles from Mapungane's, and on the right bank of the Sabi, a few miles above its junction with the Lundi (50 miles from the Inyamgamba).

By the 7th September the survey operations had been carried down to the Sabi, and a considerable supply of food had been delivered there by our porters. Before retracing our steps to Massi-Kessi, the line of frontier between the Sabi and the Limpopo still remained to

be explored and mapped. The information we were able to obtain about the country between these rivers was of the scantiest; all that we could learn from the natives was that it was covered with thick bush, that water was extremely scarce, that the population was very sparse, and that we should not be able to obtain any supplies, the previous season's harvest having failed altogether on account of a drought.

This was corroborated by Corporal Whittle, who returned to the Sabi on the 6th September, having made a reconnaissance to the Mahunjé River, about 46 miles to the south-east in the direction of our objective point on the Limpopo.

In view of the probable difficulties with respect to supplies and water, it was decided to reduce the party which was to proceed to the Limpopo, to its smallest possible dimensions, and to cut down the baggage and equipment of all kinds. It was eventually arranged that Captain Grant, Mr. Saville, and one of the non-commissioned officers of Royal Engineers were to accompany me; the rest of the Commission being left under the charge of Captain Lawrence, with instructions to finish up the survey work, erect beacons, and gradually withdraw towards Massi-Kessi.

The actual strength of the party which set out from the Sabi on the 10th September was as follows:—Myself, Captain Grant, Mr. Saville, Corporal Johnson, R.E., and one European servant (5 whites), two coloured servants, two Indunas, and 60 porters.

The loads were made up as follows:—

For myself and Captain Grant (baggage, tents, bedding, instruments, despatch-boxes, and rifles)	10	loads.
Mr. Saville, Corporal Johnson, and European servant (baggage, tents, and bedding)	5	,,
Two coloured servants (baggage and bedding)	1	,,
Cooking-pots, water-buckets, and lanterns	2	,,
Ammunition	2	,,
Barter goods	1	,,
Groceries (29 days)	3	,,
Spirits and medical comforts	1	,,
Tools	1	,,
Biscuit (22 days)	4	,,
Preserved meat (15 days)	3	,,
Rice for Europeans and servants	2	,,
	35	,,
Rice and meal for porters	25	,,
Total	60	,,

In addition to his load, each porter carried, on leaving the Sabi, 2½ days' rations of meal or rice for his own consumption.

About 25 loads of meal and rice had been sent forward to the Mahunjé

($2\frac{1}{2}$ days' journey) 2 days before our departure. Out of this the $2\frac{1}{2}$ days' rations eaten on the way there were replaced, and the greater part of the remainder was left in charge of an Induna and a porter, as a reserve for us on the return journey.

We actually, therefore, started from the Mahunjé with about $12\frac{1}{2}$ days' rations for the porters.

On arrival at the Limpopo, by sending a party nearly a day's march into the Transvaal, we succeeded in purchasing five sacks of mealies. With this exception, the whole of the food consumed by the porters (except a little meat and fish), on the march from the Mahunjé to the Limpopo and back, a distance of 270 miles, was taken with us on starting from the Mahunjé.

The following, which is likely to be of interest as an example of what can be done with carrier transport, is a somewhat detailed account in diary form of our march from the Sabi to the Limpopo, and back to Massi-Kessi.

10th and 11th September.—Left camp on the Sabi at 7.50 A.M., party consisting of five Europeans, two coloured servants, and 62 Indunas and porters. Two Portuguese members of the Commission accompanied us as far as the Limpopo, but as their transport arrangements were made independently of ours, they will not be further referred to.

Crossed the Lundi about 4 miles after starting, and reached a large reedy vley with good water, $1\frac{1}{4}$ miles further on. Halted there during heat of day. Filled water-bottles, buckets, and calabashes. Started again at 3 P.M., and marched till dark ($8\frac{1}{2}$ miles). No water. Dined and rested till 11 P.M., and then continued the march, with small halts, till 5 A.M. ($13\frac{3}{4}$ miles), when we reached a deserted village with two small pools of stinking water. Slept till 7.30 A.M., then continued $6\frac{3}{4}$ miles to a vley of good water, arriving there at 10 A.M., having accomplished 34 miles in the preceding 26 hours. The porters were so tired that it was determined to remain there for the rest of the day.

12th September.—Started at dawn, and after 12 miles reached the Mahunjé, a dry river bed, in which water was obtainable by digging in the sand. Found the bags of rice there which had been sent on from the Sabi two days before our departure. Issued $2\frac{1}{2}$ days' rations to the porters to replace those that had already been consumed. Left an Induna and one native in charge of a reserve of 10 bags of rice, and set out on our march across the totally unknown and unexplored district between the Mahunjé and the Limpopo. Proceeded $5\frac{3}{4}$ miles in the afternoon. Water in pools in the river bed. Total for the day, $17\frac{3}{4}$ miles.

13th September.—Marched 17 miles in the morning before we at length found some water in a reedy vley. Passed some deserted kraals on the way. Continued $1\frac{3}{4}$ miles in the afternoon. Water in pools in the bed of the Babgwadzi river. Total for day, $18\frac{3}{4}$ miles.

14th September.—After $11\frac{1}{2}$ miles, reached the Chefu River. Bed dry, but water obtainable by digging in the sand. Found a few natives living near the river, but they had no grain or meal, and were living

a miserable existence on wild fruits and a small quantity of game. Continued 6 miles in the afternoon through thick bush and sand. No water at camp. Total for day, 17½ miles.

15*th September.*—3½ miles brought us to the Seetoala River. Dirty-looking water obtainable by digging in the river bed. Marched 8½ miles more to the Guluzé river. Water obtainable by digging; slightly ferruginous taste. Kraals deserted. Total for day, 12 miles. We did not make any march in the afternoon, hearing that there was no water for a considerable distance.

16*th September.*—14⅓ miles to the Gunganda River. Water by digging. Continued 5⅔ miles. Camped at a spot where there was no water. Total for day, 20 miles. Guides most unreliable and appear to have no idea of distance. Some say it will take us 1½ days to our objective point on the Limpopo, others that we shall not be there for four days. Great difficulty in arranging our marches. Sometimes, when the guides tell us water is near at hand, it proves to be many miles off, and at others, when they say it is far off, it turns out to be comparatively close at hand.

17*th September.*—12½ miles to Mbatane's kraal. Water from "holes." No food supplies obtainable. 9 miles beyond this we reached the Nuanetsi River, a broad dry river bed. Good water by digging. Total for day, 21½ miles.

18*th September.*—So tired that we did not start until 6.15 A.M. Road through bush and sand. 8½ miles brought us to the Limpopo, a broad running river. Marched 6½ miles up the river in the afternoon. Total for day, 15 miles. A few fowls and eggs obtainable at kraals, but no meal or rice.

19*th September.*—Continued the march up the Limpopo, and crossed to the right bank at a point just above its junction with the Unvubu, 11¾ miles. The natives here, as elsewhere, were living on wild fruits, and anything else they could get. Sent five porters under the Induna on to a place in the Transvaal, where it was reported some mealies were obtainable.

20*th September.*—Day of rest. The porters returned in the evening, bringing five loads of meal and mealies; all they had been able to obtain.

At the Limpopo we separated from the Portuguese officers who had accompanied us so far. They proceeded direct to Delagoa Bay, while we returned to Massi-Kessi.

21*st September.*—Commenced the return march, proceeding by a shorter and more direct route to the Sabi. Camped on the bank of the Nuanetsi River. Water in pools in the river bed. Total for day, 17¼ miles.

22*nd September.*—No water till we reached the village of Luatlatla, which had a well with a fair supply. 16¾ miles.

23*rd September.*—Water 2¼ miles after starting, and a small vley 14 miles beyond this. Continued 3½ miles beyond vley. No water at camp. Total for day, 19¾ miles.

24*th September.*—6¼ miles to the Bandaré River, in which we found some small pools of water. 5¾ miles beyond this, small vley of very

muddy water. Camped at a spot without water. Total for day, 17¼ miles. European servant ill; had to be carried in an extemporized masheela.

25th September.—4½ miles to the Chefu River. Small pool of fairly good water. 15 miles more to the Babgwadze River. Pools of water. Servant still ill and unable to walk. Total for day, 19½ miles.

26th September.—10¾ miles brought us back to the Mahunjé, where we found the Induna and porter we had left in charge of the reserve rice, and four other porters whom we had sent back lame two days after leaving there. Started again in the afternoon, taking all stores with us. Servant still had to be carried. Marched 9¼ miles. No water at camp. Total for day, 20 miles.

27th September.—Marched 2¾ miles to vley, where we filled up all water-bottles, calabashes, buckets, &c., and then continued 6¾ miles to Intonjwasimba's. Kraal still deserted. One of the pools was quite dry, the other still contained a small quantity of muddy stinking water. Marched 8¾ miles in afternoon. No water at camp. Total for day, 18¼ miles.

28th September.—No water till we reached the large vley near the Lundi River—13½ miles. Reached depôt on the Sabi River in the evening. Found Corporal Whittle, B.S.A. Co.'s Police, and Lance-corporal Wilkins, R.E., in charge of stores of food both for Europeans and natives of my party. Total for day, 18¾ miles. The journey to the Limpopo and back, 315½ miles, had taken 19 days, including 1½ days' rest on the Limpopo.

29th September.—Day of rest.

30th September.—Started again in the morning, taking on every one and all stores. Between the Sabi and Massi-Kessi, streams of good water were always met with at short intervals. No further reference to water supply will, therefore, be made in this diary. Camped at Garajwa's kraal. Total for day, 18½ miles.

1st October.—Reached the Mlongesi River—16¼ miles. Fine rain fell during the morning.

2nd October.—At Musigoboya's kraal (9¼ miles) found an Induna and two of our porters in charge of 15 loads of meal, which had been collected by Captain Lawrence, and left there for us. Continued in the afternoon to the camp on the Nyamgamba, at which Captain Turner had died and been buried during our absence. Total for day, 14¾ miles.

3rd October.—Fine rain fell in the afternoon and evening. Marched by a new route 14¾ miles.

4th October.—Heavy mist during greater part of day. Corporal Johnson down with fever and bilious attack; had to be carried. Marched 14¼ miles. Camped on the Umswilisi River.

5th October.—Continued the march and crossed the Busi river. Total for day, 17¾ miles.

6th October.—Corporal Johnson still ill and had to be carried. Camped near Mafussi's. Total for day, 17¾ miles.

7th October.—Country very mountainous. Reached the Lusitu River in the afternoon (16¼ miles), where we found Trooper Jones, of the

B.S.A. Co.'s Police, and a coloured servant in charge of a quantity of stores, left for us by Captain Lawrence.

8th October.—Day of rest. Corporal Whittle taken violently ill in the early morning—dysentery and fever. Showery during day, rain at night.

9th October.—Corporal Whittle too ill to be moved. Sent off native messengers for Dr. Rayner, who was with Captain Lawrence, and was believed to be encamped somewhere near Chimanimani.

It being imperative that I should reach Massi-Kessi as soon as possible, it was decided that Captain Grant, Corporal Wilkins, and Trooper Jones should remain on the Lusitu to look after Corporal Whittle, while I continued the march, accompanied by Mr. Saville, Corporal Johnson, my white servant, and 34 porters.

Started in the afternoon, and found that the Lusitu had risen very considerably, being 3 ft. deep at the drift. After crossing the river, there is a very steep ascent of over 2,000 ft. Total for day, 6½ miles.

10th October.—Very heavy mist in early morning. Marched 18½ miles.

11th October.—Crossed the Chimanimani Pass, 5,150 feet, and met Dr. Rayner on the other side of it. He had received my message, and was on his way back to the Lusitu. The attack of fever from which Corporal Whittle was suffering proved to be a very serious one, but he eventually pulled through. Reached Malanda's kraal (19½ miles) in afternoon. Heavy storm of thunder and rain before we reached there. Found Captain Lawrence there, and also a depôt of stores in charge of two of the B.S.A. Co.'s Police.

Lieutenant Wilson and Corporal Davis, R.E., were away surveying along the watershed between the basins of the Busi and the Sabi.

12th October.—Steady downpour all day. Remained in camp.

13th October.—Rained till 10 A.M. Very misty. Started at 1 P.M. Captain Lawrence accompanying us. Camped on the Manwingi River, 11 miles. Rain at night.

14th October.—Some showers. Marched 22¾ miles.

15th October.—Reached Massi-Kessi at 5.30 P.M.—21 miles.

The distances marched, from our departure from the Sabi on the 10th September to our arrival at Massi-Kessi on the 15th October, were—from the Sabi to the Limpopo, 168¼ miles; from the Limpopo to Massi-Kessi, 376 miles; total, 544¼ miles. The time occupied was 36 days, but this included 1½ days' rest on the Limpopo, 1 day on the Sabi, and 1½ days on the Lusitu, and 1½ days' detention by rain at Malanda's, thus reducing the marching days to 30½. The average distance marched each day for the whole 36 days was, therefore, 15·12 miles, and for each marching day 17·84 miles.

Throughout the whole march, both Europeans and natives were on foot, and native porters were the only means of transport for our supplies, baggage, &c. There were no roads but tortuous Kaffir paths; part of the country traversed was bush and sand, while other portions were very mountainous, and the whole of it was situated within the tropics. More than 250 miles of our route were quite

untravelled, and we had been able to obtain only the scantiest information about this portion of it beforehand. 17 to 18 miles a-day may not seem much to persons only accustomed to the well-made roads of civilized countries, but, owing to the great heat and the badness of the tracks, this was as much as either Europeans or porters could manage, and on arrival at camp in the evening everyone was thoroughly tired out.

By the 23rd October everyone had been withdrawn from the country south of Massi-Kessi.

On the following day the greater part of the Commission started in a northerly direction, and proceeded through an excessively mountainous district to the main watershed between the basins of the Pungwé and the Zambesi. Our movements were much impeded by rain, and the mountain tops were so constantly covered with mist that survey operations were only carried on with extreme difficulty.

I got back to Massi-Kessi on the 11th November, having made a *détour* in order to visit Umtasa's kraal, and found that Captain Grant and Sergeant Clarke, who had separated from us a few days after leaving Massi-Kessi in order to complete some survey work, had already arrived.

On the following day (12th November) Lieutenant Wilson, Dr. Rayner, and Mr. Saville reached Massi-Kessi direct from the Zambesi-Pungwé watershed, where I had left them owing to Mr. Saville being laid up with a very serious attack of fever. They had been delayed on the banks of the Pungwé, which had risen in consequence of the rains, and had had to wait to cross it till the waters had subsided.

On the 14th November Captain Lawrence left Massi-Kessi with about half the British section of the Commission, and on the following day I followed with Captain Grant and the remainder. We reached Mapanda's on the 23rd, covering the 157 miles between it and Massi-Kessi in 8½ days, or an average of 18·47 miles per day. There was a good deal of rain during this period, but as it fell generally at night it did not interfere very much with our progress.

From Mapanda's we went down the river by boat to Fontesvilla, which had sprung into existence during our absence, and is the starting point of the railway now in course of construction to Shimoya's; and proceeded from there by steamer to Beira.

The detachment of the British South Africa Company's police attached to the Commission brought their own supplies with them from Umtali. The whole of the food, except fresh meat, required for the rest of the Europeans belonging to the British section of the Commission was taken out from England, and was calculated to be sufficient to last 12 persons for between 8 and 9 months.

Everything was supplied by the Army and Navy Co-operative Society, packed in cases suitable for carrier transport; and the Commission is much indebted to Major McCrea, the managing director, for the great trouble which he personally took in the matter.

For simplification and convenience of issue the various articles of food were grouped in four categories, viz., groceries, breadstuffs, meat,

luxuries. When a party was ordered away there was no weighing and measuring out of rations. The officer in command had merely to demand one or more cases of each category according to the strength of the party and the time it was likely to be absent.

The following details concerning the cases and their contents may possibly be of use to persons fitting out expeditions similar to the one on which we were engaged:—

Groceries—

70 cases, each containing—

- Tea, 2 lbs. in ½-lb. soldered tins.
- Coffee, 2 lbs. in 1-lb. soldered tins.
- Cocoa, Van Houten's, 1 lb. in ¼-lb. tins.
- Loaf sugar, 4 lbs. in a soldered tin.
- Salt, 1 lb.
- Pepper, ¼ lb.
- Lard, 1 lb. in a soldered tin.
- Arrowroot, ½ lb. in a soldered tin.
- Brand's essence of beef, two 4-oz. tins.
- Condensed milk, 2 tins.
- Solidified soups, 12 squares in a soldered tin.
- Marmalade, four 1-lb. tins.
- Curry powder, two ¼-lb. tins.
- Potted meats, four ¼-lb. tins.
- Baking powder, one ¼-lb. tin.
- Carbolic soap, 3 pieces
- Bromo paper, 1 packet } packed in waterproof paper.
- Ozokerit candles, 3 lbs.
- Compressed vegetables, 2 lbs. in a soldered tin.
- Tin-opening knives, 2.
- Dubbin, 1 tin.

The size of the cases was 28½ in. long by 13 in. broad, and 8 in. deep. Each weighed, when full, exactly 50 lbs. Ten of them were secured by locks and keys, and were used as expense stores. The lids of the remainder, for the sake of economy, were only screwed down. Whenever it became necessary to open one of the latter its contents were at once transferred to one of those with lock and key, which had already been emptied.

The arrowroot and essence of beef were looked upon as medical comforts, and were reserved for the use of the sick.

Each case was supposed to contain about 42 rations. The tea and coffee were rather more than actually required, but the excess came in handy for issue to the coloured servants (Indians and Cape boys). The sugar ration (1½ oz.) was rather small, but the weight of the cases having to be kept down, it was found inexpedient to put more than 4 lbs. in each. The ration was, however, usually increased by the issue of some brown sugar, three loads of which were bought after our arrival in South Africa. The quantities of preserved milk and marmalade were also small, but these were not reckoned as

absolute necessaries, and except on special occasions when the transport had to be reduced to a minimum could always be supplemented from the luxury boxes.

Breadstuffs.—44 cases, each containing 40 lbs. flour in 4 soldered tins of 10 lbs. each. The size of the cases was 22½ in. × 18½ in. × 9½ in., and their weight when full about 55 lbs.

63 cases of best cabin biscuits, each case containing 2 tins of 14 lbs. each. The size of the cases was 21½ in. × 15 in. × 13 in., and their weight when full about 46 lbs.

The normal daily ration was 1 lb. flour, or 1 lb. biscuit. It was found, however, in practice that while the full ration of biscuit was rarely consumed, 1 lb. of flour provided rather short commons, and towards the end of the expedition the flour ration was raised to 1¼ lbs.

It is of the utmost necessity that all tins should be securely soldered as a protection against wet and damp. The tins for the flour were specially made for us by the Army and Navy Co-operative Society, and answered their purpose admirably, but the biscuits were in the original tins supplied by the biscuit manufacturers, and in some few instances got damaged by wet, and became mouldy and uneatable owing to the soldering having given way in places. Our experience teaches that it would be a wise precaution to have all tins, not specially made for the expedition on which they are to be taken, carefully examined and resoldered, if necessary, before being packed.

Meat.—51 cases each containing 32 lbs. preserved meat in 16—2-lb. tins. The size of the cases was 19½ in. × 11 in. × 10½ in., their weight when full about 50 lbs.

The meat was of various kinds. That which was liked best was the roast beef. The daily ration when issued was 1 lb. for each person.

The total amount taken with us was only calculated for rather more than half the period the expedition was expected to last. For the rest of the time we counted on getting fresh meat or game.

Luxuries.—32 cases containing preserved fish and vegetables, sausages, sardines, butter, condensed milk, jams, mustard, &c.

These articles did not form part of the regular ration, but were issued in small quantities as extras. Those which were most appreciated were the jams and milk, and during the cold weather the butter, but tins of the last mentioned were found to be quite liquid if opened during the hot season, and could not be used except for cooking purposes.

The supplies taken with us included also 3—4-gallon kegs of lime-juice weighing about 56 lbs. each. On the days when issued the ration was 1/24th of an ordinary quart bottle for each person.

Tea, coffee, or cocoa were drunk at all meals. A ration of whisky or brandy consisting of 1/12th of a bottle was, however, served out before going to bed every second night during part of the expedition, and every night at other times. We took no wine or beer with us except a small quantity of champagne intended for use in case of sickness.

In the way of dress and camp equipment, except tents which were provided at Government expense, the officers attached to the Commission were allowed to provide pretty well what they liked, the only limitations being as regards quantity and suitability for carrier transport.

The outfit of the five non-commissioned officers of Royal Engineers was specially prepared at the Army Clothing Depôt, Pimlico. As it proved most serviceable and satisfactory, and may possibly serve as a useful guide in the future, a detailed account of it is given below.

The articles issued to each man were as follows, viz. :—

Sea Kit—

1 blue serge frock.
1 pair blue serge trousers.
1 worsted cap.
6 pieces soap.
1 clothes-bag.
1 housewife.

Special Kit—

2 brown serge Khakee frocks with four front pockets.
2 pairs Bedford cord knickerbocker breeches.
2 pairs brown canvas leggings (Abyssinian pattern).
1 white waterproof tropical coat.
1 blue woollen jersey.
2 white flannel pyjama sleeping suits.
3 flannel cholera belts.
1 white havresack.
1 waterproof cavalry kit-bag.
2 infantry mess tins.
4 pairs cotton drawers.
4 blue-grey flannel shirts.
2 white tropical shirts.
4 pairs worsted socks.
1 white helmet (10th Hussars pattern).
1 puggaree.
3 pairs foreign service ankle-boots.

The cost of the above (sea-kit and special kit), including badges of rank and ornaments, amounted to an average of 10*l.* 8*s.* per man.

In addition to the articles above enumerated, each man took with him 1 pair regimental trousers, 1 red frock, 1 great coat, 1 forage cap, and such underclothing and boots as he happened to be in possession of.

In the way of equipment each man was supplied with 2 ordinary soldier's water-bottles (1 for use and 1 in reserve) 2 blankets, 1 waterproof ground sheet, 1 pocket filter, brown leather belt and pouches, a Martini-Henry Artillery carbine, and a Webley revolver, the last

mentioned for use when surveying, and the carbine could not b carried.

The tents used by the Commission were supplied by Benjamin Edgington, Limited, and were made of green rot-proof canvas, whic proved to be most durable, and very impervious to rain.

The pattern found most convenient was the so-called "Suakin" tent, a double roof ridge-tent 6 ft. 9 in. square at base, 6 ft. 6 in high in the centre, and 2 ft. 6 in. at the sides, with an outer roof o fly projecting all round, and jointed hard-wood poles and ridge piece This tent complete with mallets, pegs, and bags formed two con venient sized loads of about 40 lbs. each when dry.

Full details regarding the instruments and other special equip ment taken out for the survey work of the commission have already been published in an article by Captain Grant, in vol. xix (1893) o the Professional Papers of the Corps of Royal Engineers.

32°

MAP OF THE
ANGLO PORTUGUESE BOUNDAR
IN
EAST AFRICA.

19°

From the North Eastern Corner of the South African Republic
to Latitude 18° S.

Constructed by the British Section of the
ANGLO-PORTUGUESE BOUNDARY COMMISSION,
1892.

By Major J.J.Leverson, R.E. British Commissioner.
Capt. S.C.N.Grant, R.E. & Lieut. C.S.Wilson, R.E.
assisted by
Sergeant D.Clarke, R.E. & 2nd Corporal T.Johnson, R.E.

Scale, 1: 1000,000. (16 Miles - 1 Inch.)

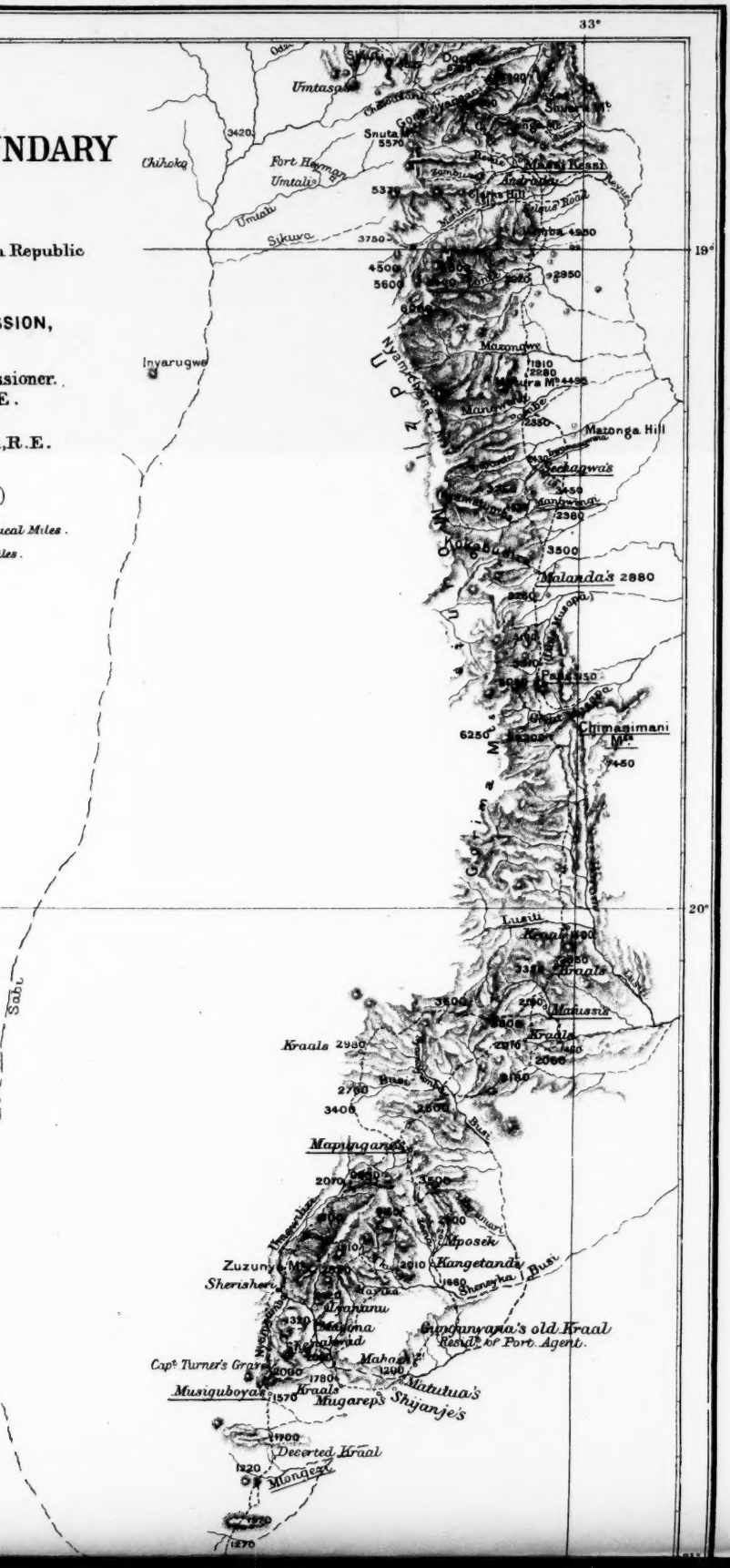
0 5 10 20 30 *Geographical Miles.*

0 5 10 20 30 *Statute Miles.*

20°

Umshagashi

Sabi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Gungunyana's old Kraal
Resid.r for Port. Agent.
Capt.n Turner's Grave
Musiquboya's
Kraals
Mugareps
Shijanje's
Deserted Kraal
Mongezy
Sabi
Nyamchonga
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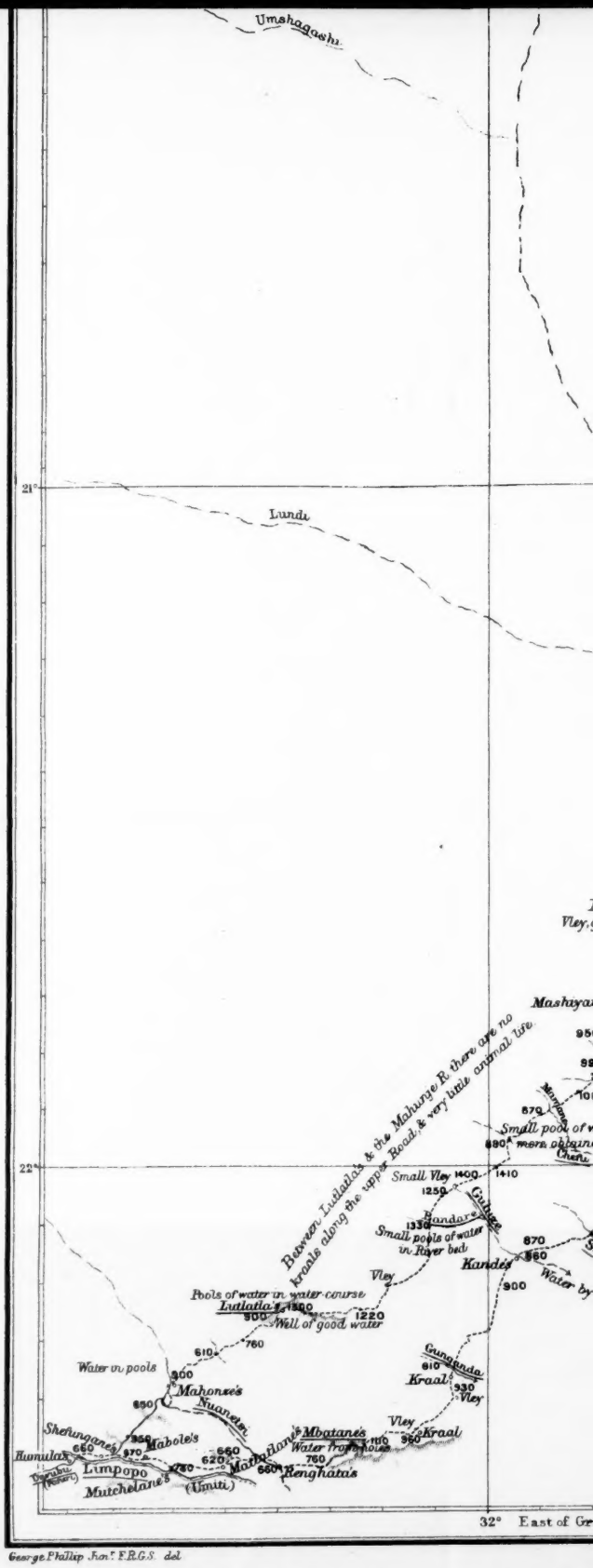
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Kandes
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900
Vley
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1220
Well of good water
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Water in pools
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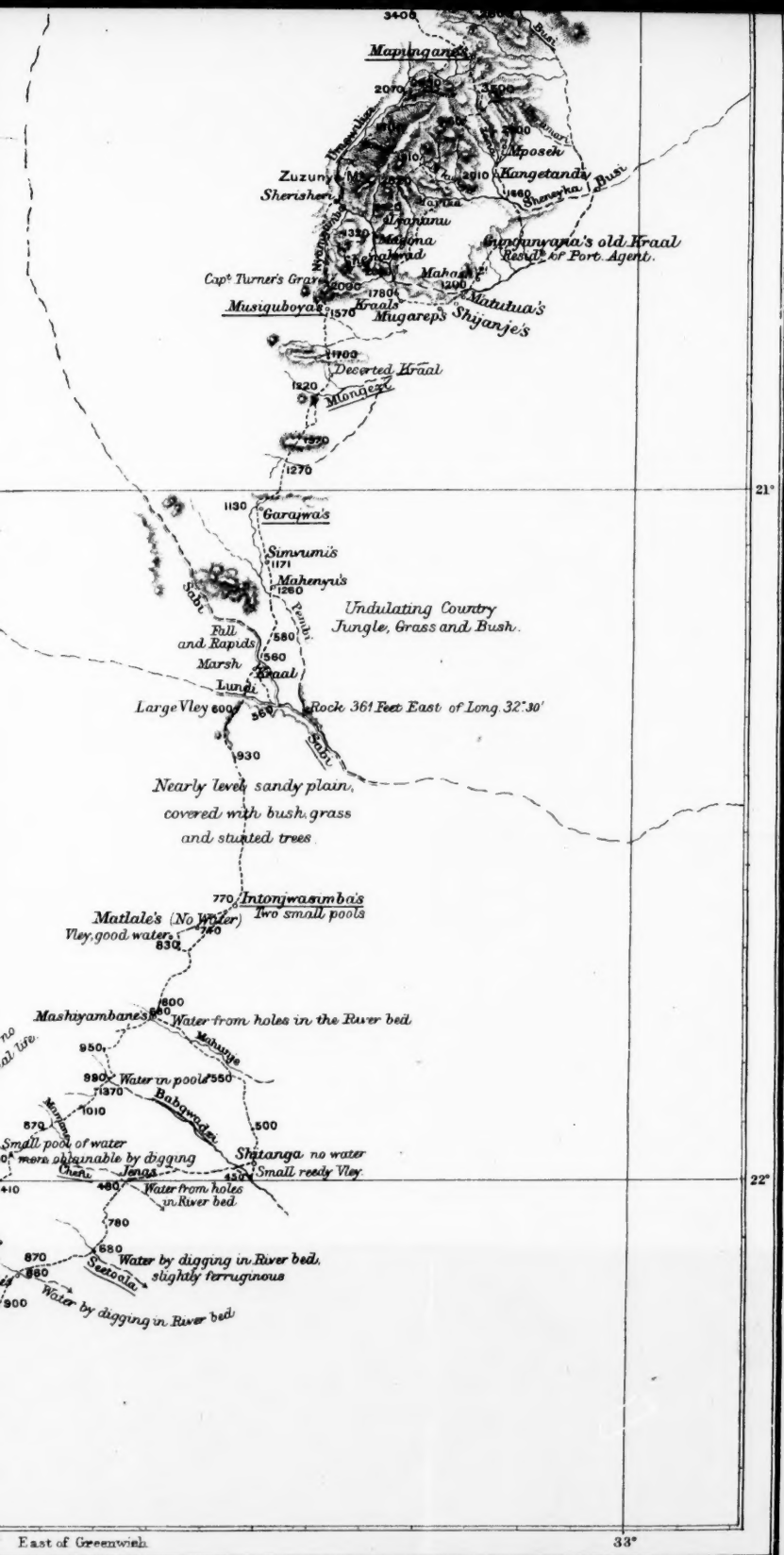


George Philip & Son, 32 Fleet St.E.C.

ORIGIN AND HISTORY OF THE ADMIRALTY BADGES.

By Rear-Admiral R. M. Blomfield.

History relates that when Philip of Macedon, father of Alexander the Great, was besieging the city of Byzantium, and had, under cover of a dark night, nearly succeeded in taking it by surprise, a light suddenly shone from the north and disclosed their danger to the inhabitants. In gratitude for this deliverance, the Byzantines built an altar to Diana, and assumed the Crescent as the emblem of the city, about 350 years before the Christian Era. This device is found on several medals of Byzantium, and it is possible that, when Constantine, in 330 A.D., dedicated his new city of Constantinopolis to the Virgin Mary, he may have added a star, to dissociate the Crescent from its Pagan origin, and to make it thenceforth a Christian emblem by uniting it with the Star of Faith, described in the 2nd chapter of St. Matthew's Gospel.

The Byzantine "bullæ," flat, circular, metallic seals of gold, silver, or lead, which commence with the reigns of Valentinian and Valens, 364 A.D., have the figure of our Saviour or the Virgin Mary, on one side, but no star; so this device may have originated at a later date, during the long and prosperous reign of Alenis Comnenus, who succeeded to the throne as Emperor in 1081 A.D., his family being of Italian origin, and this period being the memorable one of the First Crusade, whose countless multitudes threatened at one time to sweep away both his Empire and himself.

Towards the close of the 10th century the island of Cyprus became subject to the Greek Empire and Constantinople, and was placed under the banner of the Crescent. When, during the Third Crusade, Richard Cœur de Lion arrived at Lymasol, on the 6th May, 1191 A.D., he found the island under the governorship of a member of the Imperial Comneni family, which had reigned at Constantinople from 1057 A.D. to 1186 A.D., who styled himself Emperor, like his relative at Trebizonde.

The story of Isaac Comnenus refusing to allow the Princess Berengaria to land on the island, and King Richard's consequent invasion and capture of it, are well known. Amongst the spoil was the Emperor's standard, which Cœur de Lion reserved for an offering at the shrine of St. Edmund, at Westminster. When Isaac presented himself, a few days later, as a suppliant for terms, he was mounted on a Spanish charger, and dressed in a tunic of rose-coloured silk, embroidered with crescents. The star is not mentioned, but there seem to be good grounds for believing that this figured, if not on the robe, at least on the standard of the Imperial Governor.

"A foreign island was thus," says Sir Harris Nicolas, in his

history of the Royal Navy, "for the first time conquered by a British armament, and Cyprus was the first acquisition in a distant sea to the British crown. The reign of Richard Cœur de Lion forms the first great epoch in the naval history of England. Ships of a much larger size, of various descriptions, were constructed. Voyages were performed to the Mediterranean, and codes of marine law were established. The English Navy seems to have consisted chiefly, if not entirely, of large galleys (afterwards called gallisses), and of 'busses,' which were large ships, chiefly used for the conveyance of troops, stores, provisions, and merchandise."

Within a month of the capture of Cyprus, of which island he was now king, Richard I fought the first naval action in a foreign sea, and for ever associated the naval history of the Mediterranean station with that deed, and himself with the Royal Navy of England abroad, as its earliest and most skilful tactician, unrivalled on sea, as by land, in personal bravery. His attack with galleys on the huge Turkish ship, on her way from Beyrout to the support of Acre, and his capture of her through his own gallantry, energy, and skill in the utilisation of the Ram, which has so recently caused our navy a grievous loss near the same spot, are graphically described by the early chroniclers.

Hear the account of de Vinesauf, Bromton, Horeden, and Richard of Devizes, as given by Nicolas. "Richard's fleet then consisted, besides many ships of great burden, of 40 armed galleys, including 5 which he had taken from the Emperor Isaac, and 60 others 'of great excellence,' and which, to use a modern expression, were his 'men-of-war.' . . . On Wednesday, the 5th of June, he embarked in the 'Trench-the-Mer,' and proceeded with all his galleys for the scene of his future glory. . . . Ploughing their way across the seas, they made the coast of Syria, close to the castle of Margat, on the 6th of June, and then shaped their course along the land for Acre. On the 7th, when near Baruth, an immense ship was discovered ahead. This vessel, which was the largest the English had ever seen, excited their wonder and admiration. Some chroniclers call her a 'dromon,' and others a 'buss'; while one of them exclaims 'A marvellous ship! a ship than which, except Noah's ship, none greater was ever read of!' This vessel was, they say, very stoutly built, had three tall, tapering masts, and her sides were painted, in some places green, and in others yellow, so elegantly, that nothing could exceed her beauty.

"She was full of men, to the incredible number of 1,500, among whom were 7 Emirs, and 80 chosen Turks, for the defence of Acre, and was laden with bows, arrows, and other weapons, an abundance of Greek fire in jars, and 200 most deadly serpents, prepared for the destruction of Christians."

Richard directed a galley, commanded by Peter de Barris, to approach and examine the stranger, and was told that the vessel was going from Antioch to the Siege of Acre, and belonged to the King of France; but that the crew could neither speak French, nor show a French or other Christian banner. Being further interrogated,

they varied from their story, and pretended to be Genoese bound for Tyre. Meanwhile an English galleyman had recognized the ship as having been fitted out at Baruth, while he was in that port; and in reply to the King's question, he said, "I will give my head to be cut off, or myself to be hanged, if I do not prove this to be a Saracen ship. Let a galley be sent after them, and give them no salutation; their intention and trustworthiness will then be discovered." The suggestion was adopted; and the moment the galley came alongside of the ship, the Saracens threw arrows and Greek fire into her. Richard instantly ordered the enemy to be attacked, saying, "Follow and take them, for if they escape, ye lose my love for ever; and if ye capture them all their goods shall be yours." *Himself foremost in the fight*, and summoning his galleys to the Royal vessel, he animated all around by his characteristic valour. Showers of missiles flew on both sides, and the Turkish ship slackened her way; but, though the galleys rowed round and about her in all directions, her great height and the number of her crew, whose arrows fell with deadly effect from her deck, rendered it extremely difficult to board her. The English, consequently, became discouraged, if not dismayed, when the King cried out, "Will ye now suffer that ship to get off, untouched and uninjured? Oh, shame! after so many triumphs, do ye now give way to sloth and fear? Know that, if this ship escape, every one of you shall be hung on the cross or put to extreme torture." The galley men making, says the candid historian, a virtue of necessity, jumped overboard, and, diving under the enemy's vessel, fastened ropes to her rudder, steering her as they pleased; and then, catching hold of ropes and climbing her sides, they succeeded at last in boarding her.

A desperate conflict ensued; the Turks were forced forward; but, being joined by those from below, they rallied, and drove their assailants back to their galleys. *Only one resource remained; and it instantly presented itself to the King's mind. He ordered his galleys to pierce the sides of the enemy with the iron spurs affixed to their prows.* These directions were executed with great skill and success. The galleys, receding a little, formed into line; and then, giving full effect to their oars, struck the Turkish ship with such violence, that her sides were stove in many places, and the sea immediately rushing in, she soon foundered," or, to use the words of Peter of Langloft, a poet of the 13th century:—

> "The schip that was so grete, it dronkled in the flode.
> Thei teld fiveten hundred Sarazins, that dronkled were,
> Foutti and sex wer sundred, and alle tho were saved there.
> The date was a thousand, a hundreth nienti and one,
> Fro Cipres he was sailand, a toun he wan Acon."

Nearly three years elapsed before King Richard returned to England, and had an opportunity of fulfilling his intention as regards the Standard of Isaac Comnenus; but he lost no time in adopting the Crescent and Star as his Royal badge, bearing in mind, perhaps, the important part played by Constantine the Great, not only

in Christianity but in English history, and that it was from York that, on the death of his father, Constantius, he was proclaimed Emperor of Rome on 25th April, 306 A.D.

Here we leave the land of conjecture as to the early association of the Star with the Crescent for that of absolute certainty. The connection of this badge with the Royal Navy dates from the year 1194 A.D., when Cœur de Lion assembled a fleet of 100 sail at Portsmouth—the earliest naval arsenal in the Kingdom.

This arsenal was enlarged and strengthened by his successor, King John, who adopted the same badge, as did also *his* successor, Henry III. On the occasion referred to, Richard I gave to Portsmouth "a crescent of gold on a shield of azure, with a blazing star of eight points, or rays of silver, between the horns," as the heraldic crest of the newly incorporated Royal borough—a device which it has continued to bear ever since.[1]

This emblem seems to have been always considered as that of the British Admiralty until the reign of Henry VIII, as, amongst the Harleian MSS., is one containing sketches of the banners, standards, and badges of the English monarchs from Edward III to Henry VIII, executed between the years 1522 A.D. and 1534 A.D., including the then existing recognised badge of the Admiralty.

After describing the badges of the Sovereigns down to Henry VIII, the author tells us: "The Badge of the Admyralte ys a cressante with burninge fyre."

In 1453 A.D., during the reign of Henry VI, Mahomet II took Constantinople, and not only converted its ancient Christian Cathedral, founded by Constantine, rebuilt by Justinian, and dedicated to the "Agia Sophia,[2] or Logos of St. John, into a mosque, but adopted the Christian emblem of the Crescent and Star as that of the Turkish Empire. This device, after a time, ceased to be the badge of the Admiralty, possibly for the above reason, and another Christian emblem of Richard I—the Anchor of Hope—took its place. Had the old badge been retained, the Admiralty and Ottoman flags would now be identical.

The personal badge of office of the Lord Admirals throughout the reign of Henry VIII, and probably at a much earlier date, was "a whystell of golde sett with stones and pearles, hanginge at a greate and massy chayne set bawdrick-wise."

Sir Edward Howard, Lord Admiral in 1513 A.D., wore this whistle suspended by "a roope of bowed nobles," which he left in his will to Sir Charles Brandon, captain of the "Soveraigne," in the great action with the French in 1512 A.D., when the "Regiente" was blown up, and afterwards Duke of Suffolk; his "greate whistell" he had left to the King, but, being forced overboard from a galley during a naval

[1] The appropriation of one of the Royal Badges to the navy was as natural as that of the Royal Flag, which followed. The Sovereign was the recognised head of the navy, and expected, when circumstances permitted, on all important occasions, to assume executive command.

[2] The ancient cathedral at Nicosia in the island of Cyprus has the same dedication.

engagement, and drowned, on April 25, 1513 A.D., in Conquet Bay, near Brest, he threw it into the sea to prevent its capture by the enemy. His elder brother, Lord Thomas Howard, Earl of Surrey, and afterwards Duke of Norfolk, who succeeded him as Lord Admiral, wore the same badge of office, when on "Mondaye ye xxvii daye of September (1517 A.D.) in a coate of riche tissue cut on clothe of silver, on a greate courser richelye trapped, and a greate whistell of golde set with stones and pearle, hanginge at a greate and massy chayne, bawdrick-wise, accompanied with an hundred and IX gentlemen richly appareled on goodly horses (he) came to Blackheath, and there amiably receaved the Ambassadors of Fraunce." Again, at the reception of the "Lady Anne of Cleve" to marry King Henry VIII on the "XI daye of December" (1539 A.D.), when the fair lady was in charge of Lord Lisle, "Deputie of the towne of Calice," "marchyng from the turnpike on this side Gravelyng toward Calice, at a mile or more from the towne met her Grace the Erle of Southampton (Sir William Fitzwilliam), Greate Admirall of Englande, appareled in a coate of purple velvet cut on clothe of golde, and tyed with greate aglets and trefoiles of golde to the number of foure hundred, and bawdrick-wise he wore a chayne, at the which did hang a whistell of golde set with rich stones of greate value."

This is the last historical mention we have of the "greate golde whistell" as the badge of office of a Lord Admiral; but a silver whistle was, at that time and subsequently down to the middle of the 17th century, worn and used by all masters of men of war, as well as by the boatswain and his mates as in the present day, and was, for aught we know to the contrary, of the same form as the modern "call." There is an entry in the "Kinge's book of paiements 1509 A.D. to 1518 A.D." as follows: "Maye 1513, wages of 20 yeomen at sea with the Lord Admirall; Mr. Amadeo for making the King's whisseles, chaynes, branches, bottons, and aglets for the Lord Admyrall, £1,057 15*s.* 10*d.*"

The Admiralty badge was never placed on the Great Seals of the Lord Admirals, used for sealing patents and other important legal documents connected with the *High Court of Admiralty*. On these seals were represented vessels of the period, the sails of which bore the arms of the Lord Admiral's family, and, generally, the royal arms and national colours (St. George's Cross) on staves at the bow and stern, surrounded by a legend describing his rank and titles.

Our national collections are lamentably deficient in seals of the Lord Admirals, and the insignia of these must, for the most part, be looked for in the impressions attached to patents issued by them; but, of the above facts, we have evidence in "Archæologia," vol. xiv, p. 279, where is an excellent engraving of the great seal of the first Lord Admiral, Sir Thomas Beaufort, Earl of Dorset and Duke of Exeter, grandson of King Edward III, created Admiral of England, Ireland, Aquitaine, and Picardy, for life, 27 July, 1409 A.D., in the 11th year of Henry IV, his patent being renewed in the first year of Henry V, A.D., 3 June, 1413, and continued until his death to the 5th year of Henry VI, 27 December, 1426 A.D. The "Archæologia" also

gives a description of the great seal of Algernon Percy, 10th Earl of Northumberland, Lord Admiral from 1638 A.D. to 1643 A.D., and an engraving of that of James, Duke of York, Lord Admiral from 1660 A.D. to 1673 A.D., during both of which periods the anchor badge on the small seal was in common use as well as the great seals.

Although the anchor was probably adopted as the Admiralty badge when the use of the crescent and star was discontinued, I have not succeeded in tracing it back farther than the time of the Duke of Buckingham, Lord Admiral from 30 January, 1619 A.D. to 23 August, 1628 A.D., who used it on the small seal invented by him only a few months before his death for the purpose of sealing the commissions of executive naval officers; for he it was who first organized the Naval Service, and drew up the present form of commissions to captains, lieutenants, masters, &c.

Previous to the year 1628 A.D. he had used a seal bearing his own arms, surrounded by the Garter and its motto "Honi soit qui mal y pense," surrounded by his ducal coronet. This seal was circular in form, and of the size of a sixpenny bit, bearing an anchor and cable, the latter being coiled closely round the upper part of the shank, surrounded by the Garter with its motto, the whole surmounted by the Duke's coronet. On the monument erected to his memory by his sister, the Countess of Denbigh, in St. Thomas's Church, Portsmouth, shortly after his murder there on 23 August, 1628, his anchor is represented in sculpture without a cable.

The Boards of Admiralty which succeeded the Duke introduced the oval form of seal, and increased its size to about half that of the present Admiralty seal, surrounding the anchor with the legend SIG. COM. REG. MA. PR. ADM. ANG. (the seal of the Royal High Commissioners for the English Admiralty).

No change was made until the accession to office of Lord High Admiral Algernon Percy, Earl of Northumberland, on 13 April, 1638 A.D., who removed the coils of cable from the shank of the anchor and festooned the cable on either side of the shank between the fluke and the stock, leaving the ends pendant below the crown of the anchor, and the anchor itself clear of cable. He also surrounded the anchor with the Garter and its motto, being, like the Duke of Buckingham, a K.G., and surmounted the whole with his earl's coronet. The Earl of Warwick, who succeeded him as Parliamentary Lord Admiral from December, 1643, to April, 1645, and again from May, 1648, to February, 1649, used the same anchor and seal, surrounded by laurel leaves instead of the Garter.

The Admiralty Committees of both Houses of Parliament from April, 1645, to May, 1648, and the Commissioners of the Fleet appointed by the Council of State between February, 1649, and December, 1652, including Blake, Deane, and Moncke, used the anchor of the Earl of Northumberland in an oval seal of the same size (about $\frac{3}{4}$ in. maximum diameter), but without any motto or legend around it. The Parliamentary Commissioners of the Admiralty from December, 1652, to May, 1653, did the same, as also the Protector's Admiralty Commissioners from December, 1653, to May,

1659, and the Parliamentary Admiralty Commissioners (including Monk and Montague) from May, 1659, to December, 1659.

On the restoration of Charles II in 1660 A.D., the Duke of York, who was Lord Admiral from May, 1660, to July, 1673, substituted for the anchor on his small seal the Royal Arms within the Garter surmounted by his ducal coronet; but he placed the Northumberland anchor on a red flag as the symbol of supreme command in the Navy afloat, to be used by his own ship at the main when in the presence of the Sovereign, flying the Lord High Admiral's usual flag (the Royal Standard) on board another ship.

The Board of Admiralty, from July, 1673, to May, 1684, used the same seal and legend as the Boards between 1628 and 1638.

When the Duke of York succeeded Charles II as King in 1685, and at the same time retained the office of Lord High Admiral in his own hands, he placed a crown over the anchor both on the seal and flag.

Almost the last thing which Mr. Sam. Pepys, Secretary for the affairs of the Admiralty from 1684 to 1688, did before the Restoration, when he finally quitted the Admiralty, was, by the King's command, to erect a shield bearing the arms of the Royal Lord High Admiral James II, with the clear anchor, surmounted by a crown and the Royal initials, over the river entrance to the Admiralty Office which he had recently established in York Buildings, near the site of the present Charing Cross Railway Station.

The Board of Admiralty which succeeded James II at the Revolution adopted the oval clear-anchor seal of the Earl of Northumberland, surrounded by the legend used by the first Board of Admiralty in 1628 A.D., but of the same size as the seal now used.

Thomas, Earl of Pembroke and Montgomery, Lord High Admiral from 26th January, 1702, to 19th May, 1702, used the same seal and legend as the Board he succeeded, surmounted by his coronet.

H.R.H. Prince George of Denmark, Lord High Admiral from 20th May, 1702 to 1708, used the same form and size of anchor seal, but encircled it with the Garter and motto, surmounted by a crown. He also surrounded the Garter with the legend, SIGLL. MAG. ADM. ANG. HIBERN., &c. (the seal of the High Admiralty of England, Ireland, &c.).

On the Parliamentary union with Scotland in 1707 A.D. a new seal was made for Prince George bearing the legend, SIGLL. MAG. ADM. MAG. BRIT. HIBER., &c. (the seal of the High Admiralty of Great Britain, Ireland, &c.).

Thomas, Earl of Pembroke and Montgomery, who succeeded Prince George as Lord High Admiral in 1708, used the same seal and legend, except that the Earl's coronet took the place of the crown. The seal of the Board of Admiralty which succeeded the Earl of Pembroke in 1709 differs only in the absence of the Garter and motto, and in the legend, which ran as now, SIG. OFF. MAG. ADM. MAG. BRIT., &c. (the seal of the office of the High Admiral of Great Britain, &c.). No further change was made until 1725 A.D.

It was reserved for the Board of Admiralty presided over by

James, Earl of Berkely, K.G. and P.C. (First Lord from 1717 A.D. to 1727 A.D.) during the last year but one of his office, and the secretaryship of Josiah Burchett, M.P., to libel his profession by the substitution of that symbol of muddling and mismanagement—the foul anchor[1]—for the clear one of heretofore.

The Admiralty Office, which had been removed in 1694 A.D. from the house of the notorious Lord Chancellor Jeffries in Duke Street, Westminster, to its present site, where Wallingford House (once the residence of the inventor of the anchor seal, and occupied so lately as 1683 by his son, the witty Duke of Buckingham) used to stand, was rebuilt and enlarged between the years 1723 and 1726 from designs by Thomas Ripley, architect of Houghton Hall, Norfolk, and the portico with its four Ionic columns and the pediment on which rests the foul anchor badge were then erected.

Whether the change in the anchor was a mere architectural accident, or intentional on the part of the Admiralty of that day, does not appear in the records; but the seal of the Admiralty Office was made at the same time to correspond. The last letter of Marque I can find sealed with the clear anchor is by the Board of the Earl of Berkely on 23rd November, 1719, to Captain Jacob Smith of the "James" (galley), and the first with the foul anchor is by the Admiralty of which Sir Charles Wager was First Lord on the 2nd August, 1739, to Captain Peregrine Stockdale of the "Berkely," of 120 tons burthen, mounted with 14 guns. Both of these letters are addressed to Sir Henry Penrice, Judge of the High Court of Admiralty from 1715 A.D. to 1751 A.D. Between 1721 and 1739, the country being at peace, letters of Marque were not issued.

Even the clear anchor in the Admiralty flag, which had been unchanged since its first institution, was now converted into a foul one, and so appears in the official signal book for 1746 A.D., and in Thos. Blanckley's "Naval Expositor," an illustrated nautical dictionary written by the clerk of the "Surrey" in Portsmouth Dockyard, and published in 1750 A.D., under the immediate patronage of the Lords Commissioners of the Admiralty, who largely subscribed for it both collectively and individually.

Why the Earl of Berkely—a distinguished seaman, but one who had been so highly favoured by the king in the service as to be allowed to leap rapidly over the heads of his equally-distinguished professional superiors—contrary to rule—should have permitted his name to be associated with such a change as this, is difficult to understand; but I strongly suspect that Mr. Josiah Burchett had a hand in it. Mr. Sam. Pepys, whose office boy and servant Burchett had been, and who had dismissed him from his employ in 1687 A.D., had then gone to his long home some 21 years, or the deed would scarcely have passed unnoticed.

It is remarkable, too, that the Earl of Berkely only six years before the change (having been made Vice-Admiral of England in 1718 A.D., and commander-in-chief of all H.M. fleets in 1719) had flown in

[1] The badge of the Victualling Office during the reign of Charles II.

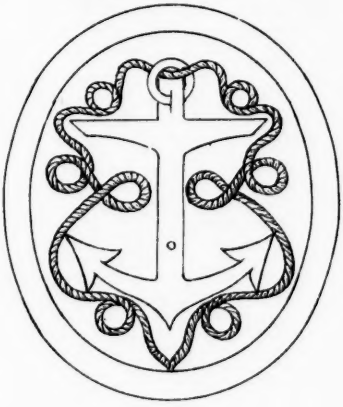
ADMIRALTY BADGES.

A.D. 1194 to 1545.

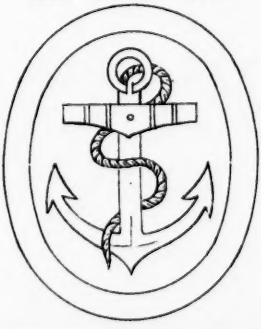
A.D. 1628.

A.D. 1628 to 1638.

A.D. 1638 to 1725.

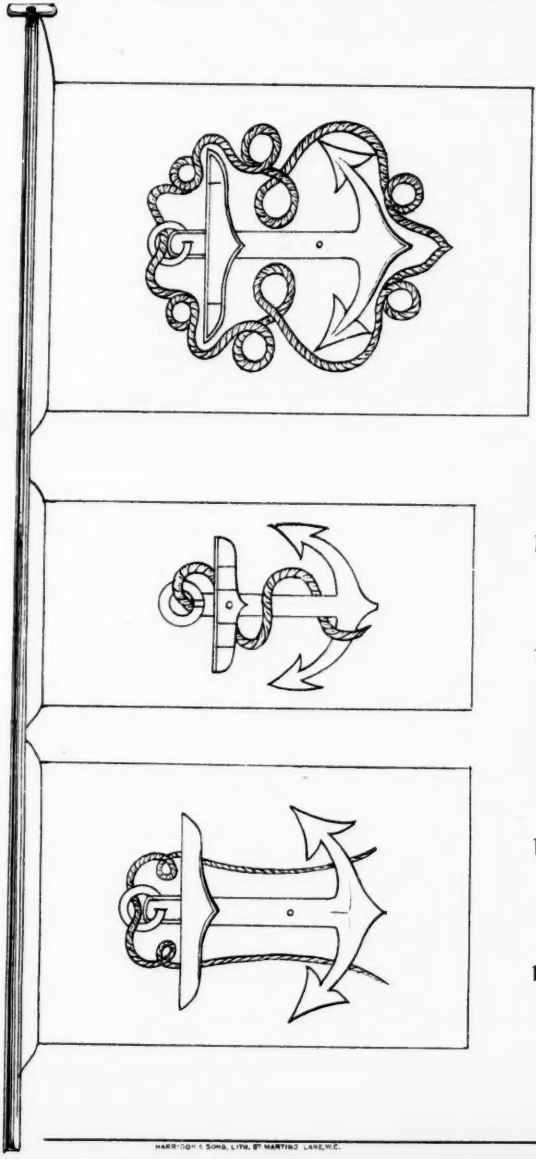


A.D. 1725 to 1893.



HARRISON & SONS, LITH. 2ND MARTINS LANE, W.C.

ADMIRALTY FLAGS.



1672 to 1725.

1725 to 1815

1815 to 1893.

HARRISON & SONS, LITH. 59 MARTINS LANE, W.C.

the latter year, by special authority of George I, the Admiralty flag with the clear anchor on board the "Dorsetshire" when in executive command of a fleet, the only instance of such a thing having been done by an individual in the history of the navy, except by a Lord High Admiral, and never by the latter except in presence of the sovereign. The anchor flag was subsequently cleared of its symbol of indifferent seamanship and neglect, but not until after the battle of Waterloo.

It is noteworthy that all the Admiralty books (including the volume of Admiralty Instructions for 1844) bore the clear anchor surrounded by laurel leaves stamped in gold on their bindings until after the Crimean war, the foul anchor being substituted for the first time in the new instructions of 1859.

Now that Ripley's building is to be replaced by a new one on a scale befitting the increased development of the navy, let us hope that opportunity will be taken to remove this blot from the Admiralty escutcheon and from the uniforms of our naval officers, and to restore the Northumberland clear anchor to the office, the seal, and the button, so that they shall correspond with the flag, which might itself be materially improved by the restoration to its anchor-cable of the festoons in which it was originally draped.

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FOREIGN SECTION.

A PRÉCIS OF THE HISTORY OF THE 1ST REGIMENT OF MASSACHUSETTS CAVALRY VOLUNTEERS DURING THE AMERICAN CIVIL WAR.[1]

Compiled by Captain R. A. HENDERSON, the Manchester Regiment.

THE Civil War in America broke out in April, 1861, but it was not until September that volunteer regiments of cavalry were raised by the Federals. As the cavalry was considered a *corps d'élite*, and the volunteers had an idea that the work would be easier, these regiments filled up very rapidly. But no attempt was made to enlist the men with regard to previous occupation, which should fit them for this particular service. It would have been better to have selected men of light weight accustomed to horses, rather than men of heavy weight who were strange to them; but this is merely one of the things that was not done as it should have been, owing to the vast undertaking of suddenly organizing an immense army.

The 1st Massachusetts was composed of three battalions, each of four companies; many of the men had already served in the State Militia, but their military experience was very limited. The company officers were at first elected by the men, in accordance with the Militia Regulations; to the command of the regiment a captain of the Regular Army, who had been cavalry instructor at the Military Academy, and was at the time serving on the Head-quarters Staff, was appointed by the Governor of Massachusetts. A Militia officer, a fine horseman and a student of war, was appointed Lieutenant-Colonel.

The selection of these two outsiders caused much dissatisfaction. The company officers had expected that the field officers would be chosen from their own members, and their discontent soon communicated itself to the men. A mutiny broke out, but is only briefly alluded to by the regimental historian. The colonel seems to have acted energetically, "for the trouble culminated in the wounding of one man and the dismissal of many officers." Several of the elected officers, proving incompetent, were soon afterwards called upon to resign. Those dismissed at the time of the mutiny preferred charges against the colonel. The newspapers commented extensively on the

[1] "History of the 1st Regiment of Massachusetts Cavalry Volunteers." By B. W. Crowninshield, Major 1st Massachusetts Cavalry, and Brevet-Colonel U.S. Volunteers. With notes and statistics by D. H. L. Glesson, Brevet-Major. Houghton, Mifflin, & Co., Boston and New York, 1891.

occurrence and his action, and much feeling was aroused. He never flinched, however, for a moment, and the public, just getting used to military matters, saw that here, at least, was a man who knew his business. Feeling quieted down. The charges were dropped, and the men of the regiment found that they had a man in command who not only knew his business but meant to be obeyed.

The first regimental camp, situated about 8 miles from Boston, was occupied from September 6th to December 29th, and here the work of fitting the raw recruits for the field went briskly forward. Mounted drill began on December 1st. Sabres were the only arms issued. The men were drilled as much as the weather permitted, and all the rest of the time was occupied in taking care of their horses, which, purchased from contractors, were said to include nearly all the unruly beasts in New England.

Horse equipment was issued on December 15th. Before that date the horses were ridden bare back with watering bridles. The colonel gradually tightened the discipline, and the men soon found that their life was not to be an easy one. Everybody in camp, from the colonel downwards, had hard work from sunrise to sunset, and punishment for breach of discipline became common. At the end of December the regiment left New England, in what strength we are not told, but with a major to each battalion, and a captain and two lieutenants to each company.

After waiting some days in New York, the three battalions embarked in several large steamers for South Carolina, to join an expeditionary force of some 15,000 men under General Hunter. After a very uncomfortable voyage, which lasted in one instance eleven days, camps were established on Beaufort Island and at Hilton Head.

This first campaign added no glory to the history of the regiment in the way of bloody battles or hard marches; but it gave officers, men, and horses an opportunity afforded to no other cavalry regiment for drill and discipline. The horses developed wonderfully; and the men, constantly subject to a most rigid discipline, got to know the officers, and the officers the men. Drilling every day shook the whole together. The result was a very effective body of cavalry. The discipline had its effect to the end, and was never lost. Nevertheless, the sojourn in South Carolina was a tiresome experience, unrelieved by amusement or excitement. Dreary surroundings, dearth of news, poor food, and a wearisome round of camp duty, drill, and discipline were calculated to make any change pleasant.

The climate caused some little sickness among the men, coming so recently from a colder one. To counteract this, at morning roll-call, they had issued to them a mixture of whiskey, quinine, and red pepper. Glanders, moreover, broke out among the horses, and spread through the regiment, and was never wholly eradicated during the war. 1,000 revolvers were secured by the lieutenant-colonel for issue to the regiment, but General Stoneman, commanding the cavalry, peremptorily refused to furnish any more pistols or carbines of any kind. One company only was engaged against the enemy, and, although it had little opportunity, we read that sabres

were drawn on one occasion, and the men, ready to charge, waited for the word. The movement, however, was countermanded.

In the middle of August, 1862, the 1st and 2nd battalions were transferred to Virginia, and arrived just as the Confederate Army, under Lee, was driving back the Federals, under Pope, to Washington. The voyage lasted seventeen days, and the horses, confined below deck at such a hot season, suffered terribly. Many of them were entirely unshod, and the rest only in front. When taken off ship they were hardly able to stand; but, notwithstanding their wretched condition, the two battalions at once marched into Maryland, through which the victorious Confederates were advancing. The condition of the men was not much better. They had suddenly left South Carolina in August, clad in the lightest clothing. They entered Maryland at a time of very cold nights—and the autumn of 1862 was unusually cold—clad just as they left South Carolina. Their baggage was not even unloaded from the transports. From the day of landing until November they could get no clothes, not even stockings or boots. Not a tent went with the regiment; even shelter tents were wanting. They were utterly destitute. But the demand for cavalry was so pressing that their going, and at once, was a military necessity. The principal trouble, however, was that the horses were unshod. In South Carolina the soil is sand, and horseshoes are quite unnecessary. The roads of Maryland are stony, and without shoes the horses soon became footsore and useless.

The enemy was met with almost as soon as the 1st Massachusetts disembarked. On the morning of September 5th 100 troopers of the regiment were despatched from the camp west of Washington to watch the fords of the Potomac. On the appearance of Confederate cavalry the detachment marched through the streets of Poolesville, a small Virginian town, to meet them, but the inhabitants, Southern sympathizers, placed obstacles across the road in rear. When the command, after a skirmish with superior numbers, was obliged to retreat rapidly through the town, it was thrown into confusion, the horses falling over the obstacles, and a captain, with thirty men, was captured. Nobody was killed, but eight or nine were wounded. Those captured were paroled. While in South Carolina ten men in each company had been armed with the Sharp breech-loading carbine; the remainder carried sabres and Colt's revolvers. But just before reaching Virginia the Smith carbine was issued—a breech-loader using an india-rubber cartridge. This was not a good weapon, and, during the ensuing winter, was condemned, and replaced by the Sharp.

The Federal Army, under General McClellan, concentrated at Frederick City on September 10th and 11th, and immediately advanced against the Confederates, who, covered by the South Mountain ridges, were in process of withdrawing the supplies they had requisitioned in Maryland into Virginia. On September 12th the 1st Massachusetts was attached to the 2nd Cavalry Brigade, of Pleasonton's Division. For the first time, a year after organization, the regiment formed part of a large body of cavalry. On the 13th

and 14th, whilst the infantry was forcing the passes of the South Mountain, the regiment was under fire, but not actively engaged. On the 14th it was doubtless saved from serious loss by being concealed in a field of Indian corn. On the 15th the cavalry division, in advance of the army, crossed the ridge, and found Lee drawn up in position behind the Antietam Creek.

This two weeks' campaigning was a period of great trial to the regiment. Rations for men and horses were issued only once between September 4th and 14th. Both men and horses had to be fed from a country nominally loyal to the Union, but in reality to the Confederacy. It was harvest time. The fields were full of ripening corn, and the trees laden with apples. Practically the men were fed on roast corn and apples, and on whatever could occasionally be got in the way of bread and other provisions from the houses, generally at exorbitant prices. The horses were fed almost exclusively upon corn stalks and leaves. The roads were very rough, and the soil, being limestone, caused irritation to the horses' feet, already wounded by marching unshod. A second terrible epidemic broke out amongst them, the disease called "greased heel." Those best capable of judging thought that the condition of the blood, from feeding on the green corn stalks, had a great deal to do with the breaking out of this disease, Whatever the cause, the result was disastrous. Nearly half of the horses of the Army of the Potomac were rendered unserviceable, and vast numbers died. Those of the 1st Massachusetts fell an easy prey, and the regiment, within two weeks from the battle of Antietam, was practically unhorsed. On November 1st, 1862, of nearly 700 men who entered Maryland, less than 300 effective cavalry soldiers remained in the field, although but few had been killed and wounded. A halt of a few days would have shod the horses and clothed the men. It would have made all the difference imaginable.

During the great drawn battle of Antietam, fought on September 17th, the cavalry division remained all day in column of squadrons, protected by a slight rise of the ground, within 600 yards or less of the enemy's artillery, massed in front of Sharpsburg village. This was the central point of Lee's line of battle, and was defended almost exclusively by artillery, comprising about 35 guns. In his report of the engagement, he mentions the fact of McClellan's cavalry "remaining all day within short range of his artillery." Three times during the day the whole division mounted, drew sabres, and prepared to charge. A charge would have probably been successful. It would have cut the Confederate Army in two. But it was not made, and about dark the division was withdrawn.

On the 18th no fighting was done; both armies, worn out by the fight of the 17th, lay on their arms, and, during the night, Lee crossed the Potomac into Virginia, without molestation. Lee withdrew the bulk of his troops to Winchester, but kept his cavalry close up to the Potomac, and by a display of activity created the impression that he wished to recross. This kept the Federal cavalry on the *qui vive*, and prevented their getting any rest.

On the 30th the regiment was attached to General Averell's brigade, consisting of the 5th United States Regular Cavalry, 3rd and 4th Pennsylvania, 1st Massachusetts, and a horse artillery battery. General Averell, Colonel of the 3rd Pennsylvania, was only 26 years of age.

This was the first time that a brigade meant anything, for during the Maryland campaign the cavalry, although brigaded, did not work by brigades. But now opportunity was given to get acquainted with the officers and men of other regiments, and the men began to feel that they were an organization other than a mere regiment. The 5th Regular Cavalry, at this time a very small command, was regarded as the nucleus of the brigade, and General Averell was himself a West Point officer. West Point officers and Regular United States troops were accustomed to look down upon Volunteers, and the associations were not, in all respects, pleasant. The behaviour of these officers and men did not inspire good feeling.

McClellan did not follow Lee across the Potomac until the end of October, but during this period the 1st Massachusetts was frequently employed on reconnaissance and in picketing the fords. In one of these reconnaissances the first Spencer (magazine) carbine was used by a sergeant of this regiment.

At the end of October there were only 200 men present for duty, while in Washington there were 450 dismounted troopers, including some recruits. In one squadron, out of 70 men on the roll, only 19 horses were fit to march. The soldiers were without proper clothing or boots. Many were in rags. There was not a tent in the regiment, except one for field officers and one for the surgeon.

Vigorous attempts, however, were made to bring the regiment into fighting condition. To accomplish this it was necessary to get clothing and tents. But horses were also wanted, and the men who had been sent to the rear were to be reunited with the regiment. The colonel got permission to purchase horses through his own officers from the farmers in the neighbourhood, and parties were sent for the same purpose in Pennsylvania. The conscription was in operation in this State, and substitutes were considered cheap at 800 dollars (160*l.*).

On November 14th the regiment marched to Washington, and thence to Acquia Creek, in Virginia, rejoining the Army of the Potomac, now under command of General Burnside. Lee was posted on the far side of the Rappahannock, at and about Fredericksburg.

The 2nd Massachusetts Cavalry commenced its organization at this time, in Boston, and took from the 1st Massachusetts many officers and non-commissioned officers, who in the 2nd received considerable promotion. Several of the best sergeants were made lieutenants in the 2nd.

General Burnside, on taking over command, broke up the Cavalry Division, and assigned a brigade to each infantry division. Such a scattering of cavalry was demoralizing, and tended to no good. The most beneficial change that ever took place was during the subsequent winter, when, under General Hooker's command, it was

organized into a cavalry corps of three divisions. This organization continued to the end of the war. The cavalry had before this been divided into small commands which, of necessity, were almost independent; it was subject to no general supervision, had no uniformity of organization or equipment, and the excellence that it afterwards attained was due principally to uniform organization, management, and equipment; and not a little, also, to the fact that a common organization produced *esprit de corps*. A little later, in the spring of 1863, the establishment of a cavalry bureau at Washington rendered this uniformity more effective.

No sooner had the regiment made its camp comfortable than orders were received for it to move towards Fredericksburg, the Federal Commander having determined to force the passage of the Rappahannock and to bring Lee to battle. On December 11th Averell's brigade began its march, over roads at first frozen, but which afterwards, when the sun melted the surface, became muddy and difficult. The march was continued all day and night, and not till next morning did the brigade arrive opposite Fredericksburg. Here it remained all through the operations connected with the disastrous battle which followed, December 13th, 1862. It witnessed with its ears alone the tremendous bombardment which was the feature of the occupation of Fredericksburg, and afterwards the frightful crash of musketry, almost without artillery, which accompanied the attack on Marye's Heights.

Not satisfied with his crushing defeat at Fredericksburg, Burnside made, on January 20th, another attempt to advance. The Army left its camp and prepared to cross the Rappahannock. But this time the elements sufficed to thwart the attempt. There came a terrible storm of wind and rain, and under the churning wheels of artillery and ammunition wagons the roads and fields were almost immediately converted into a pudding of mud, into which vehicles sank deep, and it soon became impossible to move anything on wheels. In fact, the troops themselves could not march, and the mud prevented rations being transported to them. In this state of things the cavalry was ordered out just at dark on the night of January 23rd, and was marched to the supply depôt at "Stoneman's Switch," where every trooper was given a box of hard tack, weighing 50 lbs., to put on his saddle in front of him. By this means rations were carried out to the infantry corps, who were bivouacking as best they could under the rain and without food. On the way out, everywhere could be seen wagons and artillery hopelessly stuck in the mud, and occasionally immovable. The horses and mules were detached, but were as firmly fixed in the mire as the wagons and guns, and some were drowned. Fortunately the cavalry horses were movable and got safely back to camp, but not without great fatigue and sore backs caused by the heavy boxes of hard tack borne on their withers. The movement of the Army was abandoned, and winter quarters were established. A substructure of logs, fitted across each other and plastered with mud, was made, and the tents placed on the top. Fireplaces of stone were made at one side, and for a chimney a barrel

set up on end worked very well. Fireplaces were sometimes made outside the tents or huts with an underground flue, covered with flat stones, and the chimney on the other side of the tent. This kept the ground dry and the tent warm.

Better and more varied rations were now issued. New horses were supplied to the cavalry, and hay became a regular portion of their feed. Pressed bales were brought down in great quantities.

Orders were given that the pigs, sheep, and cows of the natives should not be interfered with. It was a good deal to ask the hungry troopers to pass by such delicacies, and, somehow or other, pigs or sheep often appeared in the camps. When remonstrated with, a common excuse of the men was that they could not be expected to be attacked by such animals without offering resistance; and it was evident that these animals became very dangerous in Virginia in 1862 and 1863.

The severe outpost duty performed by the cavalry told heavily on the troops. General Hooker informed one of our officers that, in order to carry out this duty properly, he ought to have 30,000 cavalry in good condition. It was doubtful if 5,000 in good condition were present with the Army at this time, although many more appeared on the muster-rolls. The horses suffered terribly, and the glanders, which first appeared in the regiment a year before, broke out again with violence, and committed great ravages.

The horses and men had scarcely any time for drill and little for rest. The cavalry had to picket and patrol the river front from Falmouth up to Rappahannock Station, a distance of 20 miles; and at the same time, assisted by troops at Dumfries, to guard the whole right flank of the Army and communications from Washington down to the Rappahannock, 40 miles. Reconnaissances had to be made as far as Warrenton, 25 miles, and every week or so large detachments would be sent out to scour all that intricate country, rendered almost impassable by muddy and difficult roads.

The regular line for outpost work was divided among the three divisions. The picket headquarters of Averell's brigade was at Hartwood Church, at a distance of about 5 miles from the camp. The duty was so hard upon the horses that many perished from lack of food and exposure to rain, snow, mud, and cold. Some of these tours, owing to the absence of the rest of the regiment on reconnaissance, lasted ten days at a time. The winter was cold and wet, and the horses were without shelter. They stood at the picket-rope in mud half-way up to their knees, and, in the spring, the survivors were in bad condition. The men, however, acquired a good knowledge of picket duty, and, although chances for drill were like angels' visits, yet when the spring campaign opened the cavalry was more efficient than before. Our camp, situated on a little elevation, was well drained, and proved a healthy one. The men suffered little from illness.

Only a few days before the regiment began a tour of picket duty at Hartwood Church, the famous Confederate General Stuart had made a raid upon the outpost line, and had captured five companies of the 3rd Pennsylvania and 1st New Jersey.

Hartwood Church was situated at the junction of several important roads. One of the regiments in our brigade, the 3rd Pennsylvania, the first to do outpost duty here, established its reserve in the church itself. An attack was made on the pickets by Stuart's cavalry, which, taking a bye-road, avoided the pickets, and came upon the reserve unexpectedly. The officers and men, making themselves comfortable in the building, were surprised and captured. The position of the reserve was thereafter drawn back about a third of a mile into a wood, and only vedettes were stationed near the church.

Frequent reconnaissances were made in a westerly direction, into the debatable ground beyond our pickets. A strong one started December 31st, 1862. This was to have been a raid to reach, if possible, the James River and the Federal lines south of Richmond—at least so it was reported—while a part of the column was to go to Warrenton and other places, in order to mystify the enemy as to our intentions. Infantry and artillery were to hold the fords of the Rappahannock, at which the cavalry were to cross, and some wagons took forage and rations, to be distributed when the river was passed. Just as the column reached the river, a dispatch came from Washington recalling the expedition, on account of the fact that Stuart happened at this time to be making a raid with 4,000 cavalry close up to Washington. A part of the expedition thus deferred made an effort to cut off Stuart, marching on his line of retreat through Warrenton for that purpose. But on this, as on most occasions, Stuart proved to be like the Irishman's flea, when we put our hand on him he was not there! One part of the column got near enough to see a few of his men, and some stragglers were captured. This was the only result of this great expedition—a march through the desolate country of 86 miles in three days.

On January 27th Hooker replaced Burnside in command of the Army of the Potomac. On January 1st a large part of the force had not been paid for six months. Hooker greatly improved the organization in every way, but particularly by the appointment of competent officers as Inspectors of troops of all arms. Frequent formal inspections of the regiments followed, and these inspections were also directed towards the outpost duty, which, up to this time had been simply under the supervision of the officers commanding the troops. Nothing was so salutary as this inspection. The Officers conducting it were given ample powers, and Commanders of outposts who were found negligent of their duties were in some cases instantly dismissed the Service. Every brigade had an Inspector, and the Inspectors themselves were organized thoroughly under the Inspector-General of the Army of the Potomac. All arms were carefully inspected, and the Smith carbines were condemned at this time and replaced by the Sharp.

The picket duty was so exacting that every man was usually on picket one-third of his time, and occasionally oftener. They were on vedette two hours and four hours off. Officers were expected to be awake all the time, except in reserve.

While on picket, the horses were not allowed to be unsaddled,

except a few at a time, for the purpose of being groomed, and when this was done the saddles were at once replaced. Each morning, an hour before sunrise, every man on outpost, whether actually on picket or not, "stood to horse," and remained ready to mount, until some time after the sun rose. The utmost vigilance was exacted. The pickets were constantly without fire or shelter, by night as by day, in frost and storm.

On February 12th the cavalry was reorganized. It was now composed of three divisions, General Stoneman commanding. General Averell was transferred to the command of the 2nd Division, and his 1st Brigade, to which the 1st Massachusetts was assigned, was commanded by Colonel Duffié, of the 1st Rhode Island Cavalry. He was a Frenchman, formerly an officer of the 4th Chasseurs d'Afrique, accomplished, enthusiastic, and popular. The Regular regiments, 1st, 2nd, 5th, and 6th Cavalry, were organized in a reserve brigade, under General Buford, and relieved from outpost duty. From Duffié's brigade 500 men were constantly on picket. The colonel, on taking command, instituted brigade drills, and by his zeal and knowledge did much to increase the efficiency of the brigade. By his good nature and activity he won the confidence of all his regiments, and afterwards did good service in the field.

On February 5th an expedition under command of Major Chamberlain, 1st Massachusetts, consisting of a brigade of infantry, with artillery, and the 1st Massachusetts, started out to destroy the bridge at Rappahannock Station, recently repaired and held by the Confederates. The expedition encamped at Grove Church the first night, after a march in rain which froze as it fell. In the morning Major Chamberlain blocked all the fords with infantry and artillery, and then with the cavalry succeeded in destroying the bridges, after something of a fight, in which several men were killed and wounded on both sides. This day the cavalry marched 40 miles.

On February 25th an attack on our outpost line was made by General Fitzhugh Lee, with 1,500 cavalry. The force near Hartwood Church was driven in on the infantry pickets. A Pennsylvanian cavalry regiment behaved badly and ran away. A Court-Martial was assembled; the regiment was found guilty of deserting its post in presence of the enemy, and all were sentenced to death. This sentence was not carried out. The regiment was a new one, with officers as inexperienced as the men; and this fact afforded a reason, if not an excuse, for their behaviour. There were captured from this regiment 150 men and 6 or 7 officers, besides many killed or wounded. The Confederate loss was 3 officers killed, and 2 officers and 7 or 8 men captured. Their loss occurred through a rash charge, which carried them too far. They met a reinforcement which turned the tables.

Sickness in the regiment, which during the winter had averaged 12 per cent., towards the end of March averaged only 5 per cent.

The battle of Kelly's Ford, March 17th, was a deliberate attempt to try conclusions with the enemy, for the purpose of adding prestige, if possible, to our troopers before the spring campaign. The Con-

federate cavalry, in force, was known to be a short distance beyond the ford. General Averell was selected to take an equal force, and after carrying the ford, protected by rifle-pits, drive in the advanced guard, and attack the enemy on his own ground. Averell took across the river about 2,000 sabres and 8 H.A. guns.

The programme was carried out to the letter, and after driving the enemy back we made them develop all their force. The enemy's attacks were successfully repulsed, and Averell withdrew unmolested. It was a success, and showed all engaged what could be done. Our regiment was not engaged in this action, but was employed in guarding the roads towards Warrenton.

By the commencement of the spring campaign, the cavalry was properly formed into brigades and divisions. Better officers were coming to the front, and great improvement, particularly in the regimental officers, was attained, while the men had learned the duties of a soldier pretty thoroughly. But the wearying and never-ending picket duty of the winter made the same improvement impossible with the horses, and they were sadly out of condition when camp was broken. The band had to be dismounted in order that their horses could be given to mount the troopers, and many men were left behind for want of horses, not only in the 1st Massachusetts but in all regiments.

Up to June, 1863, the dismounted men were organized in camps, moved from place to place, and a tolerable system of remounting men and sending them to their regiments was established. During the summer, the Cavalry Bureau was organized at Washington, and the remounting and refitting were accomplished on a large scale through it. A large camp was established near Alexandria, where all dismounted men were sent, and were remounted. This camp was an improvement on the former system, but it was a source of demoralization to men temporarily in it, and many good soldiers after being there a short time were never good for anything again, while not a few never rejoined their regiments.

At the end of April the campaign began. General Hooker, having decided to cross the river, in the face of Lee, and attack him, masterly dispositions were made. The cavalry were to cross the Rapidan and make an extensive raid in the country towards and to the south of Richmond, to destroy all the bridges, railroads, and canals, rendering the country impassable to Lee's army, who would thus be cut off from his base of supplies, and be at the mercy of Hooker's army, when he should defeat him. But continual rain and bad weather so handicapped the cavalry that, instead of cutting off Lee from his base of supplies and destroying all the roads, it made such slow progress that the Confederate cavalry came up and prevented the accomplishment of the plan.

The history of the battle of Chancellorsville need not be repeated here. Everybody knows how Hooker's army, probably the best that ever marched in America, through his strange loss of power, was rendered helpless. Although a great part of it was not engaged, all had to recross the river after five days of severe fighting, suffering

defeat by detail at the hands of an active and enterprising enemy. Had Hooker kept his cavalry in hand as a part of his main army, Stonewall Jackson's flank march, which was the principal instrument of Hooker's defeat, would have been impossible. But the cavalry, weary and unsuccessful, came in on the right flank, whence it had gone out, having accomplished little, or nothing, but a tiresome march.

The cavalry of the two armies, after Chancellorsville, remained opposite to each other, and many fights occurred; but nothing important took place until the battle of Brandy Station, June 9. On that day, General Pleasonton crossed the Rappahannock, with all the cavalry and some infantry supports, with the intention of reconnoitring towards Culpeper Court House. The Confederate cavalry, under Stuart, was stationed near Brandy Station. After heavy and successful fighting all day, the Confederates were put on the defensive and made to develop their entire forces, and even bring up the infantry. General Pleasonton, in the late afternoon, recrossed the river unmolested, having fully accomplished the object aimed at. Only an insignificant portion of the division to which the 1st Massachusetts belonged was engaged, but two squadrons made a successful charge and completely routed the 4th Virginia Cavalry, charging them just as they were getting into line-of-battle, and taking them, perhaps, at a slight disadvantage on this account.

The battle of Brandy Station was, for the cavalry, the turning point of the war. The Confederates were never met before, or afterwards, in such force. They here lost their prestige and never recovered it. McClellan, Stuart's Adjutant-General, says, "It made the Federal cavalry."

General Pleasonton reorganized the cavalry, after Brandy Station, into two divisions of two brigades each, with a reserve brigade. The 1st Massachusetts belonged to the 1st Brigade of the 2nd Division, under General Gregg.

For a whole week after Brandy Station the cavalry of the two armies were not in contact. Lee had sent his to the east, to cover the movement of the main body of his army into Maryland. Hooker, aware of this, was marching his army north, keeping between Lee's army and Washington, and ordered his cavalry ahead along the Bull Run Mountains on the east side, to give him warning of any movement of the enemy in that direction.

Apparently, after losing the touch, each General became uneasy, and, with the desire of learning the whereabouts of his adversary, each advanced his cavalry. They came in contact at Aldie. The 1st Brigade of the 2nd Division, 1st Massachusetts leading, was in front when the enemy were discovered advancing in full force. Each had been in utter ignorance of the proximity of the other, and the brigade was not even concentrated. The 1st Massachusetts struck the enemy in force, and became engaged by detachments, in all cases against a superior force of Confederate cavalry, who were protected by stone walls, banks, and lines of trees, while our regiment fought in the open, without any protection whatever. Each side was

successively reinforced, and gallant and successful charges were made, which the enemy returned. The fighting was severe, indeed at times desperate. Five cavalry regiments and a battery were engaged on each side. The Confederates retreated, finally, leaving the battlefield to the Federals. The field was dearly won. Being the attacking party, our loss was greater than the enemy's. To the 1st Massachusetts it was a bloody day, but not an inglorious one. Many were killed and many were captured. The colours of the 5th Virginia Cavalry were captured by the regiment as the result of a charge, in which the colour-bearer was killed.

The losses of the regiment were:—

	Officers.	Men.	Total.
Killed.....	1	23	24
Wounded	4	38	42
Prisoners	3	85	88
Total	8	146	154

Before the fight, the regiment had had 4 squadrons—8 companies—and, altogether, a little more than 300 men; but after this terrible loss it was reorganized into 2 squadrons.

The 1st Massachusetts was not severely engaged again until after the battle of Gettysburg. Gregg's division was engaged in that battle on the second day, on the right; but the regiment, although deployed in line of battle, was detailed to bring up the 6th Army Corps, and reached the field with them next morning. This fight on the right was severe and brilliant, and defeated Stuart's attempt to pass round our right flank.

On the third day at Gettysburg, the regiment was detached to act as provost guard at army headquarters, and was deployed a great part of the day in rear of the line of battle, to stop straggling and to take charge of prisoners.

Some of the cavalry, during Lee's retreat, were engaged with the enemy's infantry and cavalry and trains, and very sharp fighting was the consequence, as, also, at times preceding the battle, when driving Stuart up through Maryland and preventing his junction with the main body of Lee's army. For the regiment it was a time of very severe marching rather than fighting.

After Gettysburg, General Lee retreated, and, though there was much skirmishing, Meade was unable to prevent his passing into Eastern Virginia, where he took up his old position across the Rapidan.

On July 7, 3 officers and 100 men joined the regiment, and the squadrons were again reorganized into four.

The month of August found the army again in position along the north fork of the Rappahannock River. Lee's army lay between the Rappahannock and Rapidan, and the time was used by both armies for what, during the war, passed for rest and recreation. For weeks nothing more than insignificant picketing and reconnaissances were attempted.

The regiment, at first, was camped near Sulphur Springs and Amissville, and afterwards was in bivouac at Waterloo and Orleans, in rear of Plum Run, and picketing was done along the Run, while constant patrols and reconnaissances were made to Flint Hill and neighbourhood. Frequent raids were made on the pickets, and the whole country round about was swarming with partisan rangers. An ambuscade, only too successful, was sprung upon a party of the 6th Ohio Regiment while on scout towards Barbour's Cross Roads.

In September, orders were given to recruit a new battalion in the place of the 3rd Battalion, permanently detached, and three officers were sent to Massachusetts for this purpose.

On the 13th of September, General Meade pushed across the Rappahannock River, and a fight with the Confederate cavalry took place near Culpeper. In this fight the 1st Massachusetts supported a horse artillery battery, and the first intimation of the proximity of the enemy was their suddenly becoming a target for his artillery. The Confederates retired on Rapidan Station and withdrew most of their troops to the south side.

On the morning of the next day, Colonel Sargent, 1st Massachusetts, was ordered, with three cavalry regiments, to drive the enemy across the river and develop his strength on the other side. As the other side was particularly open, and at least a division of infantry could be plainly seen there, enjoying themselves, with the bands playing popular Confederate airs, this order seemed somewhat unnecessary, but it was reiterated. Nevertheless, Colonel Sargent could effect nothing, as the enemy were protected by a large force of artillery on the south shore, where the land is much higher and controls the lower land on the north side, and he was absolutely without artillery.

These two days resulted in considerable loss of life to both sides, but honours were not easy, as several guns were captured from the enemy near Culpeper.

On September 23, the 11th and 12th Corps left the Army of the Potomac to join Grant's army in Tennessee. The 2nd Division of cavalry followed these two corps in their march as far as Callett's Station, and then went to Fauquier White Sulphur Springs, and picketed the line of the river at that place.

General Lee assumed the offensive on October 12, and attempted the same movement he had made in 1862, which ended in the second battle of Bull Run; making a very rapid advance, and crossing the river at White Sulphur Springs and other fords down the river. For a week or more everything had been peaceful and quiet. But at about noon that day the pickets reported cavalry of the enemy on the other side of the river. Suddenly, without the slightest warning, fire was opened from a large number of guns, and was instantly followed by a strong attack, which was so sudden that the bridge could not be destroyed. Lee's troops, in mass, swarmed down to the crossing, cavalry and infantry, and before the squadron holding the bridge could get to its horses, mount, and withdraw, the enemy were massing their troops on our side of the river.

On the night of the 12th, Meade rapidly marched his army in

retreat along the line of the railroad, with Lee on his flank in close proximity. During the few hours of rest allowed to both armies that night, they were bivouacked not merely close to one another, but some regiments were actually within the lines of the other. Before daylight the next morning, October 13, at Auburn, the regiment, on attempting to water its horses, found Stuart's troopers attempting the same thing at the same place. Fighting at once commenced, and continued all day long, and late into the night. Stuart, with his headquarters and a considerable body of his troops, had passed the preceding night actually within our lines, and, had his position been known, he could have easily been captured with about 2,000 of his men.

The retreat from Warrenton Junction and Auburn to Bristoe Station, at which point the road would bring all Lee's army in conjunction with Meade's line of retreat, was across a particularly open country, and the 2nd Cavalry Division was used all day as a rear-guard, retreating by échelon, with the horse artillery in the intervals of regiments, and Stuart advancing his in pursuit with the same disposition.

The division showed a solid front, however, and no battle was brought on.

Meade's retreat was complete and artistic in every way; and he accomplished the movement from the Rappahannock River to Centreville without the loss of gun or wagon, although the two armies were actually in contact the whole distance, and some severe fighting occurred, notably at Bristoe Station, where the infantry gave the advance of Lee's attacking forces a sharp repulse, and captured a battery.

During the retreat, from October 12 to the 16th, the cavalry had no rations issued, and as they started without any, appetites were good when Centreville and the wagon train were reached.

Lee, in his turn, retreated, Meade following him. After a sharp fight at Rappahannock Station, Lee recrossed the Rapidan. This ended the fighting for that year until Mine Run.

On the 26th November, Meade began his movement in the so-called "Mine Run Expedition." Crossing by the lower fords of the Rapidan, he marched by the Orange Plank Road to attack Lee on the line of Mine Run. The enemy was first met at New Hope Church, in the wilderness, where the woods are so thick as to be apparently impenetrable. Two squadrons of the 1st Massachusetts, who were leading, were employed dismounted. The Confederates, by nightfall, were pushed back to their works on Mine Run. The loss of the regiment in this fight were 1 officer and 4 men killed, and 2 officers and 11 men wounded. Curiously, although the 1st Massachusetts had the advance and suffered the principal loss, it was not allowed to put "New Hope Church" on its colours, while other cavalry regiments were allowed to do so who were scarcely engaged in the fight.

Two days later, while the regiment was picketing the left flank of the army at Parker's Store with the 3rd Pennsylvania Cavalry, a division of Confederate cavalry, under Wade Hampton, came suddenly upon it by circuitous roads, killing and wounding several men

and capturing nearly everything in the way of baggage, except what the men had on their persons. The 3rd Pennsylvania was on picket, and the 1st Massachusetts was in reserve and unsaddled. The enemy in some way avoided the pickets, and came dashing into the reserve without warning.

Meade recrossed the Rapidan on the night of December 1. Owing to bad roads the retreat was very slow and very tedious: halts were numerous, and the men became very weary.

After an interval of picket duty, the army went into winter quarters between the Rappahannock and Rapidan rivers. Lee's Army of Northern Virginia was just across the river. The 1st Massachusetts were quartered at Warrenton.

The winter of 1863–64 was a very severe one for picket duty; and hardly a week passed without a minor raid being made, which made things lively, and kept the men and horses in health by the exercise. A raid was made on the 1st of January, 1864, to the Shenandoah Valley with the expectation of surprising a camp of some Virginian cavalry regiments, supposed to be quartered there near Front Royal. The Confederate regiments were not captured—perhaps were not there—but the regiment had a curious march of it. The day of setting out was warm and mild, sloppy and muddy. The weather suddenly changed, and what had been snow and water changed instantly into ice. The force bivouacked that night at Orleans, and passed the whole night trying to get warm enough to be able to sleep. The next day the cavalry may be said to have slid and skated to Front Royal, over the mountains; and finding the expedition a bootless one, except that it burned several tanneries and factories of horse equipments, returned by Manassas Gap.

On March 24, the newly-raised battalion joined headquarters from Boston.

At that time recruits were not as easily procured as they had been; and, probably to encourage enlistment, Governor Andrew saw fit to recruit new officers with the men. Consequently, when this battalion joined the regiment, it was with entirely inexperienced company officers. This was not pleasant for the officers in the eight old companies of the regiment, of whom many had risen from the ranks, and all had been engaged in hard work at this time for over two years. A bad feeling was produced in the regiment. The men of this battalion, numbering 400, without any training, added at first very little, if at all, to the efficiency of the regiment, except upon the muster roll. It turned out that in the first 15 days of the campaign of 1864 this new battalion went all to pieces; and before the 15 days were over many of the men of these four new companies were assigned to others.

The need of officers during this winter at Warrenton was very urgent. From December 15 to March 24 no field officer of the regiment was present, and out of 28 line officers in the eight companies only eight were present for duty. Every effort was made to bring back officers absent on staff and other detached duty, but without success.

In the winter of 1863–64 the three years' term of service of many

regiments expired. As these regiments had seen most service, and were the most reliable in the army, every effort was made to induce the men to re-enlist. Offers of large bounties and promises of long furloughs were the principal inducements. Almost every day the re-enlistment scheme assumed a different phase. Finally, when the offer was made that any company of which two-thirds should re-enlist should go home as an organization, only one company of the 1st Massachusetts did so. The officers and men had expected that the officers for the new battalion would be selected from their number; but when it was found that for the four new companies and 400 men not only new and inexperienced officers, but even new non-commissioned officers, were selected, re-enlistment was almost stopped, and many who had put down their names took them off the list.

The pay of line officers was at this time much reduced by charges for an enlisted man as servant and other embarrassing stoppages from the Inspector's Department. But the pay of private soldiers and non-commissioned officers was continually increased, and the re-enlistment bounties were enormous.

One squadron was detached to headquarters, Army of the Potomac, in April, 1864, to act as guard and escort to General Meade. This squadron never rejoined the regiment; and at the expiration of its term of service the men were mustered out separately from the rest of the regiment.

In March General Sheridan took over command of the cavalry corps of the Army of the Potomac, in accordance with General Grant's desire.

On the 26th April, 1864, the whole division broke up winter quarters, and the forward movement began.

The cavalry crossed the Rappahannock River on May 4, and advanced through the wilderness to Cedar Run, near Todd's Tavern, where severe fighting took place.

General Lee had at once put his army in motion to attack Meade and Grant. In the fighting which ensued, the cavalry of both armies came together on the left flank, south of the infantry. As our cavalry advanced to open up the roads, Sheridan's troopers fought a constant succession of battles with the cavalry of Lee, in which they were almost uniformly successful. The 1st Massachusetts had its share of fighting, and lost at Todd's Tavern several officers and men.

As the country was too intricate for cavalry General Grant ordered Sheridan to march with his whole force to the rear of Lee's army, and cut off his communication with Richmond. The movement began on May 9, and was a continual succession of bloody engagements which ended at Yellow Tavern and Richmond. At the battle of Yellow Tavern General Stuart was killed, and, in his death, the Confederate cavalry suffered a loss which was irreparable. It was their last serious attempt to accomplish anything during this raid of Sheridan. They withdrew or followed Sheridan feebly, both men and horses being utterly worn out.

After Yellow Tavern Sheridan advanced towards Richmond, until

he was close to the city and fortifications. Unfortunately, provisions and forage were utterly gone, and a double line of fortifications bristling with artillery was between the weary cavalry and their Mecca. He then moved towards Haxall's Landing, on the James River, and the raid was over.

From May 4 to May 12, out of 15 officers and 522 men, the loss of the 1st Massachusetts was 8 officers and 116 men, a pretty high percentage for so brief a time.

Since crossing the river the horses had not once been unsaddled, nor had any camp been established. What rest men and horses obtained was got in the roads, wherever they happened to be, men and officers holding the bridles of their horses and lying down in the dirt alongside of them. Rations were insufficient, and it was only on the 15th day from the crossing of the river that the horses were unsaddled, and the men had time to wash themselves or change their clothes.

While Sheridan's cavalry was thus acting independently in the direction of Richmond, the balance of the army was fighting the series of battles about Spottsylvania Court House, and gradually pushing on towards Richmond by the left flank, fighting at every step. The disturbance created by the cavalry raid was only temporary. Lee's communications with Richmond were soon re-established, and Sheridan's raid was more successful on account of its battles with Stuart's cavalry than as an injury to Lee's army by preventing its communication with Richmond.

The cavalry rejoined Meade's army on May 25, but two days later was again on its way towards Richmond. Crossing the Pamunkey River at Hanover Town, it advanced rapidly to within 15 miles of Richmond, and at Hawes' Shop was met by Stuart's cavalry, May 28. A severe fight—and hardly any more severe engagement occurred during the war—followed. The losses were great on both sides, but victory rested on the Union banners. In this battle the 1st Massachusetts was drawn up in column of squadrons and supported the artillery.

This movement of the cavalry was for the purpose of opening a crossing of the river to the rest of Grant's army, which followed immediately on the heels of the cavalry. By the overlapping of successive army corps on the left, Grant's army was brought to Cold Harbour and the James River.

While these last battles were being fought, the cavalry was disposed on Grant's flanks. On the day of the battle of Cold Harbour the 2nd Division was engaged for a short time with the enemy's infantry.

On June 6, General Sheridan began the Trevilian's Station raid, and the 1st Massachusetts took its share in that—a fatiguing march and accompanied by severe fighting. The fighting occurred about Trevilian's Station and at St. Mary's Church. At the latter place the 2nd Division was compelled to fight a force five times stronger than itself. A most desperate struggle ensued, during the latter part of which the 1st Massachusetts was in the fore-front. It

behaved with its usual steadiness, and was the last to leave the field. Sheridan had two divisions with him on this raid, and they did not rejoin the army until June 28, arriving in a very exhausted state with no less than 2,000 men dismounted. The fighting at St. Mary's Church was the result of an attack by the Confederates under Hampton on the 2nd Division, which was covering the crossing of the James River by the 1st Division and a large train of wagons. It is thus described by an officer of the 1st Massachusetts, who was present:—

"Just as we arrived, Hampton attacked in force with infantry, artillery, and cavalry. We were sent at a gallop into the line, and found every regiment but ours fighting, dismounted, and heavily engaged. We were put to support our batteries, and stayed with them, 12 guns in all, which were firing canister into the advancing rebels. It was no use; it did not stop them. Our men on the line were out of ammunition, and in 10 minutes the whole line was on the skedaddle. The batteries' ammunition soon gave out, too, and we were 7 miles from our trains; there was nothing to do but run for it. We saved the guns with difficulty. The rebels had infantry and their whole cavalry corps against our two small brigades. They outnumbered us five to one, at least. We were the last to leave the field, and I think it was as hot a place as ever I got into.

"The enemy came on so fast there was no time to mount the skirmishers, and, as the whole division was fighting on foot, there was a devil of a mess and confusion.

"The road was full of led horses and artillery, all mixed up with pack mules and men mounted and dismounted, all shouting and cursing. It was the most disorderly retreat I have ever seen since I have been in the service. If the rebels had pushed hard just then they would have gobbled the whole thing. The day was awfully hot, and the men had had no water all day, and had been fighting two hours against an overwhelming force—the last part without ammunition, darkness coming on, and we were all played out with marching, heat, hunger, and fighting day and night for the past 18 days continuously. You can imagine what it must have been. The rebels captured a good many of the dismounted men in the lines, and while trying to get their horses. As it was, they were so completely used up that they could not run. They would go a few rods, and then if their feet touched the least obstacle they would pitch head over heels and lie there. We told them the rebels were right after them, then they would get up with great effort and try again, but it was no use; they had not the strength, poor fellows! All this time the 1st Division was in camp, only 7 miles away. They knew nothing of what was going on with us. General Gregg had sent couriers, but they were all captured, and no news of our situation got through. Hampton drove us until it got dark, when he stopped, and we tried to get some order into the division. In the confusion the men had got away from their regiments, and in the darkness everyone camped where he found himself, and waited for daylight to put things right. Some of the 10th New York went to the river before stopping. Next morning we woke up,

tired enough, I tell you. The trains went on to Wilson's Landing, under cover of gunboats, and, later, we followed. The whole expedition lasted from the 6th June to the 25th, and it was h—ll. The 1st Maine lost 66 men and 10 officers. All lost heavily, and the loss in horses was very great, while those left were all used up—living skeletons.

"After reaching the James, it took us two days to cross everything to the south side. General Wilson, at this time, was on his raid. After a few days we were sent out to meet him, and help him into the lines. We did not find him, although his stragglers were everywhere, and he came in the other way, having lost all his wagons and artillery, and more men than they care to have known. I don't think these great raids amount to much."

General Wilson, on June 21, with the remaining division of cavalry, had begun a raid to destroy the railroads leading south from Richmond to Petersburg. This raid, as we have seen, proved unfortunate: many guns and men were lost, after having merely temporarily destroyed Lee's communications south, and the division rejoined Grant's army in a demoralized and almost disorganized condition.

There is no instance during the war of a cavalry raid making any interruption of communications which was not soon repaired. While it temporarily disarranged connections, yet no army was forced to abandon its position on account of such interruption. Still, these raids brought the cavalry of both sides together and furnished opportunity for a good many lively battles.

The three divisions of cavalry, in pretty poor condition after such severe work, were united in rear of the right of the army, and obtained a little period of rest, which they had well earned after the raids of the past three weeks.

The next movement of the cavalry was July 27. Sheridan marched all three divisions across the James River, and at New Market Lee's infantry attacked our cavalry, who were dismounted, and was severely repulsed, losing two standards. Two pieces of our artillery, however, were captured.

The 1st Massachusetts was engaged dismounted, and lost several men in this fight. This movement was an attempt to make Lee think we were about to attack Richmond, and cause him to send troops in numbers to the north bank of the river, and was really a diversion in favour of the attack to be made when the Petersburg mine was sprung. The whole force was withdrawn on July 29, the blowing up of the mine having proved a signal failure.

At this time General Early made his desperate attempt to create a diversion in favour of General Lee, by invading Maryland. On July 12, he appeared in front of the fortifications of Washington, which city he came within an ace of capturing.

The successful Shenandoah Valley campaign, under General Sheridan, came as a sequel to this movement; but the 2nd Division remained with Grant's army.

At no time during the war was the hardship anything at all equal

to that during the summer of 1864. While the work was most severe and unremitting, there were fewer officers to perform it. The pay amounted to nothing. Not a single squadron in the regiment was commanded, at this time, by an officer of higher rank than second lieutenant. Only two captains were present on duty, and each commanded a battalion. Several sergeants declined promotion, owing to the excessive responsibility and totally inadequate pay.

It seemed, at times, impossible for regiments to continue in the field. The men would get dismounted at a fearful rate; and once a man got dismounted, he would often disappear and never be seen again.

After the 1st and 3rd Divisions had gone to the valley of the Shenandoah with Sheridan, the cavalry with Grant's armies consisted of the 2nd Division, under Gregg, and Kautz's brigade. On the Confederate side there were two divisions. These occasionally made attacks on Grant's flanks and rear, and thus encountered Gregg's division, which was used generally to picket the flanks and rear. It also took part in all attempts to advance our lines on the left, along the Weldon and South Side railroads. On September 16 the brigade, to which the 1st Massachusetts belonged, marched rapidly down to the Jerusalem Plank Road, nearly to the Noltoway River, where the enemy was found in earthworks with artillery.

A raid had been made the day before on the rear, and a herd of 2,500 cattle had been captured and carried off by Lee's cavalry. It was hoped that they might be recaptured, but the enemy had too much start. General Davies and his troopers got their blood up and charged the works most gallantly, surprising the enemy, and capturing prisoners. Several charges were made. In this fight the regiment lost 2 killed, 10 wounded, and 9 missing.

Six officers and all men who had joined on the raising of the regiment, and who had not re-enlisted, left the regiment soon afterwards, and were mustered out on October 24.

On November 1 the 1st Massachusetts was engaged at the Vaughan Road, where the whole brigade threw up hastily constructed earthworks, and fought so well that the enemy was three times repulsed, and finally fell back. In this fight the 6th Ohio, being surprised at the beginning, lost 100 men taken prisoners. The 1st Massachusetts lost 2 killed and 3 wounded.

The regiment went into winter quarters at Westbrook House on November 28, and began logging up the tents and the establishment of a permanent camp for the winter.

The regiment took part in a most successful expedition to Stony Creek Station two days afterwards. The station was protected by a small fort, and near the station were a mill and large storehouses. The fort was attacked by our cavalry mounted, and captured. The mills, factories, shops, and storehouses were destroyed.

A week later another expedition, on a large scale, was ordered to endeavour to interrupt the enemy's use of the Weldon railroad altogether. Much of the track was destroyed, and the bridge across the Meherrin River was burned, but Colonel Sargent, 1st Massa-

chusetts, was killed. The men suffered severely from cold on this expedition, and some had their feet frozen while on the march.

Colonel Tewkesbury succeeded Colonel Sargent, and the 12 companies were consolidated into 7 and the nucleus of an eighth.

The strength of the regiment, on paper, was 729 men; but there were present with the colours about 400 only.

Recruits came from Massachusetts, composed principally of Germans and French, the latter mostly Alsatians. Of these many were excellent soldiers, in spite of their ignorance of English.

The last expedition the regiment made with the 2nd Division was on February 5 and 6 to the Vaughan Road, where the enemy were met with, and a severe fight ensued. In this engagement the 1st Massachusetts was held in reserve, and not engaged. The division lost about 120 men.

On March 17 orders came for the regiment to go to City Point for provost duty. Its chief duty there was guarding the prisoners, who came in by thousands.

The surrender of General Lee was announced on April 9, and the end was in sight.

On May 2 the march north began. The regiment, after participating in the review of the Army of the Potomac, went into camp on May 28, near Alexandria; and on June 25 left Alexandria for home, arriving two days later at Readville, which place it had left almost exactly three years and six months previously.

A month later, on July 18, the men were paid off, and separated for ever as soldiers.

It may be remembered that, when the 1st and 2nd Battalions of the 1st Massachusetts Cavalry were sent from South Carolina to Virginia, the 3rd Battalion was left behind at Hilton Head.

August 4, 1863, this battalion was made independent of the other two, and was called the Independent Battalion, Massachusetts Cavalry Volunteers; and, in February, 1864, was incorporated with two battalions newly recruited in Massachusetts, and organized with them into the 4th Massachusetts Cavalry, of which it became the 1st Battalion.

In January, 1864, this battalion shared in the expedition under General Seymour to St. John's River and in the engagements that ensued. In May it was ordered to Virginia, where the whole regiment was attached to the 10th Army Corps.

At the commencement of 1865 the headquarters of the regiment were attached to the Army of the James. Two companies of the regiment were the first troops to enter Richmond (April 3). The guidons of these companies were the first Union colours carried into that city, and raised by Union troops. They floated from the Capitol building until a larger flag supplied their place.

The regiment continued with the Army of the James during the pursuit of General Lee, who hoped to cross the Appomattox at Farmville, destroy the bridges, and escape towards Lynchburg. The Army of the James had reached Burkesville on the night of April 5, and General Grant, foreseeing this movement of Lee's, gave orders

for a detachment to be sent to destroy these bridges, and so hinder Lee's march. The fight which followed was so brilliant, and had such important results, that an extract from the Adjutant-General's Report of 1864, may be interesting:—

"Shortly before midnight on the 5th of April, Colonel Washburn (4th Massachusetts Cavalry) received orders to take command of a small force consisting of his own cavalry, the whole available strength of which (with him) was then but 13 officers and 67 men, with two small regiments of infantry, the 54th Pennsylvania and 123rd Ohio, and to move early on the morning of the 6th to destroy the bridges over the Appomattox, near Farmville, some 16 or 18 miles distant from Burkesville. At four o'clock on the morning of the 6th of April this small command, less than 700 strong, left their smouldering camp fires; the men, particularly of the infantry, exhausted by the severe marches of the few previous days, were hardly in condition for the hazardous duty to which they were called. The march was necessarily slow, as the cavalry had to regulate their pace by that of the tired infantry. As the column advanced, signs of the near proximity of the enemy became more and more apparent, and it was soon evident that the expedition partook in a great degree of the character of a forlorn hope.

"A few hours after the column had started, and Lee's line of retreat had developed itself, General Ord received information of the exact locality of the Confederate Army, and at once sent Brevet Brigadier-General Read, Assistant Adjutant-General of the Army of the James, to inform Colonel Washburn of his danger, and to order him to return. By dint of hard riding, Read, with a single orderly, overtook the detachment very near the locality where, an hour later, the battle of High Bridge was fought. Messengers, sent out by General Ord shortly after Read had started, were driven back by the enemy, who, in their retreat towards Farmville, had swung into the same road along which, only a short time previous, Washburn with his command had marched, and the spectacle was presented of a hostile army filling the road between Washburn's troops and the Army of the James, and neither Washburn nor the Confederate leaders were aware of the close proximity of the other. Shortly after General Read had joined the command of Colonel Washburn, it was ascertained that, from the direction of the march of the Confederate Army, it had become impossible to rejoin General Ord, and nothing remained but to push forward and endeavour to destroy the High Bridge. The column accordingly advanced a short distance further until it arrived within sight of the structure, then rather more than three-fourths of a mile distant. The intervening country was marshy and inaccessible to cavalry. Furthermore, it was discovered that there was a strong redoubt at the head of the bridge, toward Farmville, covering with its guns all the surrounding country, which was open and marshy, and it was certain that, if a direct assault should be attempted, the attacking force would melt away before it could reach the enemy's abattis. By making a wide détour and coming on the rear of the redoubt, it was thought that a sudden

attack might be successful. Washburn undertook the accomplishment of this with his cavalry. General Read remained with the infantry in a narrow belt of woodland about a mile from the bridge, the country in the immediate vicinity being somewhat broken and hilly, and more or less covered with a growth of young trees. Soon after leaving the infantry, the cavalry came to a small stream, the bridge over which had been partially destroyed. On a hill just beyond was a line of low earthworks occupied by a small force of dismounted rebel cavalry, who opened fire immediately on the approach of the Union troops. Lieutenant Davis, with the advance guard, dashed forward, swam the stream, and, while some of the men laid the planks on what stringers were left of the bridge, the remainder, under the lead of the gallant Davis, charged up the hill, and attacked the enemy with such fury that they were driven completely back to their reinforcements near Farmville, where they made a stand. The main column came up rapidly and threw out a strong skirmish line, engaging the enemy vigorously for about half an hour, when the superior numbers of the Confederates, aided by the artillery, compelled Washburn to withdraw. The retreat had hardly commenced when heavy firing in the direction of the infantry indicated the presence of a large force of the enemy. A few minutes of rapid riding brought the cavalry within sight of the belt of woodland where the infantry lay, and, leaving the road, Washburn led his men across the country and through a narrow ravine to the rear of the hill where the battle was going on. Had he kept the road, a quarter of a mile further, around almost the first bend in the road on the small hill beyond, would have brought him in direct contact with the head of the Confederate column of cavalry which from this point filled the road back towards Burkesville as far as the eye could reach. This, however, was not known to Washburn or his men at the time they left the road and struck across the country. The squadrons trotted up the slope and formed line at the summit, under the heavy fire, as calmly as if they were on review. Then the situation became apparent. The infantry, wearied out, and with ammunition nearly exhausted, were falling back before the fierce attack of a large force of dismounted rebels in front, who filled the air with their yells of victory. Masses of cavalry were forming on the left for a charge, and the dismounted troops in front were being rapidly reinforced by mounted men. Colonel Washburn sent his adjutant to the left to rally the breaking infantry, while he himself held a hurried consultation with General Read. Upon the return of the adjutant with information of the state of affairs at the left, Washburn determined at once to charge down the front of the line, throw back the dismounted rebel troops upon their cavalry, and, by an advance of the infantry to his support, wrest victory from the enemy. It was a brilliant but desperate scheme, there being but one alternative—that of cutting through the enemy and leaving the infantry to their fate. This alternative received not a moment's consideration. The colonel turned to his men, and in a few words told them of his purpose and its probable results. Swinging into column of fours, the command moved

at a trot to the right and in advance of the infantry. Then, quick and sharp, came the order, 'Fours left, gallop, march! Charge!' The clear notes of the bugle rang out, sounding the charge, and the small battalion, with a ringing cheer, swept upon the foe. Quickly re-forming his command, Washburn retraced his steps with a large number of prisoners, the result of the charge. On approaching the edge of the woods, what was the astonishment of the officers to see the Burkesville road filled with a column of Confederate cavalry, and coming across the field, between the road and the woods, were three lines of battle. The enemy's cavalry were everywhere seen galloping to the succour of their defeated van, and the sight from the top of the hill was enough to discourage the stoutest heart. The Federal troopers drew rein to re-form for another charge, and their young colonel and their blue standard led them once more, as they dashed down the gentle slope, crashing through line after line, until all order was lost, and it became a hand-to-hand contest. After the officers were down and there were no leaders, little groups of our Union troops were to be seen here and there fighting desperately, and it seemed as if each man felt

> 'As though himself were he
> On whose sole arm hung victory.'

But another huge grey wave, capped with its glittering crest of steel, broke over them, and their work was done.

"Not a man escaped from the field. Scarcely 15 minutes had elapsed since the first charge had been made; but in this brief space of time, of 11 officers in the cavalry who went into the fight, three were dead, five wounded, and the others unhorsed and taken prisoners. General Read was killed in the woods almost immediately after Washburn had left him. The colonel lay upon the field, severely wounded, with his comrades scattered here and there, and all those yet living overpowered and captured. In that handful of heroes was one among the enlisted men, Colour-Sergeant Thomas Hickley, towards whom the heart of every man in the regiment thrills with gratitude to this day, not only for the bravery with which he had borne the standard through the thickest of the fight, but because, when all hope of victory was gone, he had the presence of mind, and made the opportunity, to utterly destroy it before he was captured. The battle was over. The small body of infantry, their ammunition exhausted, and deprived of the support of their cavalry, was unable longer to sustain the unequal conflict with the overwhelming force of the rebels, and had surrendered in a body. The victors had nothing further to do than to dispose of their prisoners and despoil the slain. The latter were stripped and left unburied upon the field, where they were found early in the morning of the 7th of April by the advancing troops of the Army of the James; and this was the first information which General Ord received of the result of the expedition sent out by him the day before.

"It would be difficult indeed to find, in the history of modern warfare, anything more brilliant than this action at High Bridge. It

seemed at first to be a useless sacrifice; but it proved to be so far from this, that it probably very materially hastened the great surrender. It was a battle fought against the most fearful odds; for those 11 officers and 67 men attacked Rosser's and a part of Fitzhugh Lee's divisions of cavalry, some of the finest troops in the Confederate Army, while Longstreet's corps was within supporting distance. Nearly 100 rebels were killed or wounded in this engagement—from their own account—and among the slain was General Dearing, commanding one of Rosser's brigades, one colonel, three majors, and several officers of lower grades.

"The moral effect of this battle was such that General Lee supposed the attack to be made by the advance of a large force which had in some manner outmarched him and got in his front. He was therefore so delayed in his retreat, by the preparations he deemed necessary, that both Sheridan and Ord gained valuable hours in pursuit. The fight took place shortly after 12 o'clock, and it was late in the afternoon before the cavalry column started on the march with their prisoners."

After Lee's surrender the regiment performed a routine of guard and courier duty, until it received its final discharge, November 26, 1865.

Many officers of all the companies of the 4th Cavalry were of the old 1st, either as enlisted men or as officers, so that their honour and glory is common to the 1st.

When the regiment was first organized, the system for the regular army had recently been adopted of having three battalions, each complete in itself, with quartermaster, commissary, &c.; but these additional officers were not allowed in volunteer regiments, as it was expected that they would serve together, and not by battalions. A corps of pioneers was established in 1863, consisting of one sergeant and sixteen men. They rode at the head of the regiment, and had to do regular pioneers' work. Besides their arms, some of them carried axes slung across their shoulders, some shovels, and some picks. In winter, when the tents were logged up, they built the staff officers' huts, hospital, commissary, &c. Details from companies usually built their own and their officers' huts.

The pioneers of the 1st Massachusetts were unusually clever at their business, so they were much in demand to make the Generals and Staffs comfortable. During the winter of 1864–65, before Petersburg, they built a little church and gymnasium.

The men of the regiment who came from the cities, and those who came from the country districts, were about equally divided. At first most of the officers came from those cities and towns where the companies were raised. Those whom Colonel Williams appointed afterwards were all from cities, and many of them had graduated from Harvard College within a few years. But as time wore on promotions were made from the ranks, and many of those thus advanced came from the country districts, so both officers and men were about equally divided between the city and country. There was nothing to choose between the two classes, but in the city companies there

were more foreigners. The recruits sent to the regiment, as the war was prolonged, became less and less satisfactory. Bounty men and substitutes were not the equals of the volunteers who originally enlisted. Some of them were professional bounty jumpers "on the make," trusting to chance for an opportunity to desert. The drafted men would do almost anything to escape service, and in the early part of 1864 some actually mutilated themselves in order to avoid the campaign. Some men deliberately shot themselves in the foot, hand, or arm. One veteran who had learnt his business was easily worth a dozen recruits.

There does not appear to have been any restriction placed on enlistment owing to youth, as it is recorded that a sergeant in the regiment was only 15 years 7 months old, two privates 15 years, and one private only 14 years and 9 months.

The South Carolina experience, though of no use to the country and army directly, afforded none the less an unusual chance to the regiment for drill, discipline, and learning all the principles of outpost duty. Marching and fighting had to be learned afterwards, as also the matter of supply. But the system was acquired in South Carolina under the admirable teaching of Colonel Williams. Throughout the cavalry corps the regiment was well known for its steadiness, and frequently in an engagement it was held in reserve for an emergency, and thus missed chances of distinguishing itself. At such times it not unfrequently supported a battery, or stood still under fire, waiting its opportunity.

As a rule, the men were not good horsemen, neither did they ever excel in the use of firearms. It would have been vastly better for the service if the regiment could have been recruited among men who in size, disposition, and previous mode of life were especially adapted to be cavalrymen.

It was one of the drawbacks of the soldiers raised in the eastern part of the country, and particularly of the New Englanders, that they were not used to firearms, and they were consequently poor shots. New Englanders, from their mode of life, were more adapted for the infantry and artillery than for cavalry service, and not even in South Carolina was there time or opportunity for making the men first-rate horsemen. The drill and the evolutions of a regiment were quickly learned, and well, but the horsemanship was, to say the least of it, indifferent. The Confederates had an immense advantage in their universal practice of horsemanship and familiarity with firearms.

The men were thoroughly well drilled in sabre exercise, both on foot and mounted. At picket duty the regiment was particularly good, and in this service it never was once surprised, and suffered exceedingly little loss during the whole war. Almost without exception, the other regiments with which it was brigaded were at one time or another surprised, and lost many men in killed, wounded, and prisoners while on picket. Many of the 1st Massachusetts were killed and wounded, but almost none captured before they could give the alarm. Whenever the regiment was stationed in any town, and

several times it was, notably at Warrenton, it had a high reputation for good behaviour, which was the direct result of its discipline, added to the excellent character of the men themselves.

The good cavalry soldier was always a good provider. The excellent trooper had forage for his horse when nobody else had. Perhaps such a man might be slightly oblivious at times of the difference between *meum* and *tuum*, and very likely his maxims would not do for a Sunday school. But Sunday schools do not raise cavalry, and in war other morals hold good. Some men were always well mounted, and their weapons were ready all the time; of such men is an efficient cavalry regiment composed.

The vicinity of the picket rope was not a place for fine-spun theories on morals. It frequently happened on a march through a new part of the country that strange horses would appear. "Where did you get that horse?" from the captain usually provoked an irrelevant answer.

It was odd how a little art would change a horse's appearance so that his own dam would not know him, let alone owner or breeder. With a pair of scissors a very nice imitation of a brand would be made to appear on the shoulder or hip. A little hair-dye would remove all white marks, and the same scissors would so change the mane and tail as to make the animal unrecognisable. A piece of horse-hair drawn about the coronet would produce an immediate and unaccountable lameness, which a knife would instantly dissipate. Almost any change in appearance or gait could be produced at a short notice by a cunning trooper.

While in Maryland a new horse would occasionally appear, and frequently also the owner afterwards in search of a lost animal. Though the picket-rope was searched, somehow the missing animal was never there.

During a campaign and on a march the farrier had his hands full of work. Before the second year of the war, experience had shown that it was a good thing to be prepared for emergencies, and every trooper had to have one front and one hind shoe fitted for his horse in his saddle-bags, with nails, ready to be nailed on when needed. The Burden machine-made shoe, which had at that time been recently patented, was used, as it required less time to fit it than to make a shoe from the bar iron.

During the whole war an efficient veterinary surgeon was very much wanted. In 1864 the pay for one was authorized, but none ever joined the regiment. In place of one there were plenty of aspirants to the reputation and fame of "horse doctor," usually farriers, but sometimes privates.

Much of the horse equipment was cumbrous and useless. In time of war, except on the plains, there was no need of a lariat-rope or picket-pin. Even watering bridles were unnecessary. The heavy leather skirts of the saddle, intended to keep the coat from being soiled, were found useless. Towards the end of the war the men frequently used the saddle-tree without the leather skirts (they were easily unscrewed from the tree), and in order to make the saddle sit

better, the men would put their own blankets under the saddle over the horse blanket, and thus prevent a saddle gall, and at the same time carry their own blankets more comfortably. The heavy-hooded stirrups were unsightly and unnecessary, and quickly got out of shape when wet and muddy. The wooden stirrups without the leather were better, and many of the bits were too severe.

Of the equipment, the rattling scabbard with iron rings made a ceaseless noise. Had the straps been fastened directly to the scabbard without the jingling ring, the noise would have been avoided; the absence of this noise would have been an advantage to scouting parties. The men finally learned to fasten the sabre, scabbard and all, firmly to the near-side of the saddle, nearly parallel to the horse's body, and when mounted to throw the leg over it. It was then ready to be drawn when mounted, and was not in the way of the dismounted trooper, who had quite enough to do to take care of himself and his carbine in the thickets into which he had so frequently to go when skirmishing. On foot a sabre is seldom of any use, and is dreadfully in the way.

The sabres were originally the regular United States weapon, made at the Ames Works, Springfield, Mass. In 1863 a lighter weapon of English make took their place. Many officers had the long, straight sword of the French Centgardes, a dangerous-looking affair for thrusting. All the sabres were ground as sharp as possible.

The revolvers were the Colt's large holster pistol—an excellent weapon. The men used to keep their revolver in its case on the belt, or, ready for immediate use, inside the right boot leg.

The Confederates were armed with sabres of all sorts, usually of English make, but sometimes with a heavy Austrian cavalry sabre. They had usually Colt's revolvers, which they managed skilfully; but sometimes they had an English revolver—"Kerr's patent"—not as good a pistol as Colt's. Their ammunition was frequently English. They had sharpshooter companies in a regiment, often two, and the remaining companies were armed with revolvers and sabres. Some of their regiments had English Enfield carbines, and some were armed with a carbine made in Richmond, like a short Springfield rifle, made to sling, while some had long rifles slung across the shoulders. The carbines were in 1862 the Smith—a poor weapon—condemned in February, 1863, and replaced by the Sharp, which was the weapon in most general use in the United States cavalry.

When in camp, réveille was sounded before sunrise; stable call, 6.30; sick call, 6.30; orderly call, 7.15; breakfast, 7.30; watering, 8.30; guard mounting, 8.30; drill, 9.30; recall, 10.30; drill, 11; recall, 12; dinner, 12.30; drill, 2; recall, 3; stable call, 3; retreat and dress parade, quarter of an hour before sunset; tattoo, 9; taps, 9.30.

The drill was French, the formation double ranked, and, except the 1st Maine, all the regiments in the Army of the Potomac used the same drill. The text-book was M'Clellan's.

Besides the drill according to M'Clellan's cavalry tactics, the men

in both camps in South Carolina were taught to leap their horses over timber and ditches. In this exercise the men were fully accoutred with arms, and, in jumping, the sabre would make wild movements. So did men and horses sometimes, and the exercise provoked abundant mirth. It was not all fun by any means.

The names of battles on the flag of the 1st Massachusetts allowed by general order were as follows: Poolesville, South Mountain, Antietam, Fredericksburg, Chancellorsville, Brandy Station, Aldie, Upperville, Gettysburg, Williamsport, Culpeper, Auburn, Todd's Tavern, Fortifications of Richmond, Cold Harbour, St. Mary's Church, Bellefield, and Vaughan Road.

THE KRNKA-HEBLER BULLET.

By Captain F. L. Nathan. R.A.

One of the latest developments of the small-bore magazine rifle question, is the tubular bullet, invented by Charles Krnka, of Prague, and William Hebler, of Küssnacht, and recently patented in this country. The inventors point out that one of the chief causes which detrimentally influence the velocity of a projectile through the air, is the resistance of the atmosphere, which arises from two causes, viz. :—

1. The condensation or compression of the air strata immediately in front of the projectile; and
2. The formation of a vacuum immediately behind the projectile.

In carrying out their invention, which is mainly designed to diminish, as far as possible, the resistance under both of the above heads, they make the projectile pointed at both ends, and with an air channel or passage through it.

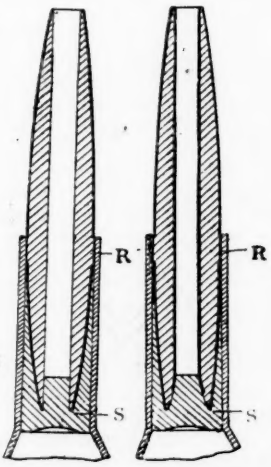

Fig. 1. Fig. 2.

The sketches represent two forms of hollow bullet for small-bore rifles. In Fig. 1 the projectile has a steel envelope only; in Fig. 2 the hollow also is lined internally with a tube of steel, which gives to 5-mm. (0·197-in.) bullets the necessary rigidity. To impart

rotation, the bullets are made with a projecting ring (R) where they enter the neck of the cartridge case. A sabot (S) of paper, or similar material, is fitted to the base of the bullet to prevent it oscillating in the bore, and also to prevent the escape of gas; this sabot frees itself from the projectile as the latter leaves the gun. Instead of being made of lead with steel envelope, the bullet can be made entirely of steel or other metal; in the case of steel, a ring or band of some softer metal being attached to the bullet.

Professor Hebler, in an article recently published in the "Allgemeine Schweitzerische Militär-Zeitung," and which has been reproduced in several foreign service periodicals, states that the first experiments with tubular bullets date from 1874, but for a long time they met with no success, as the soft lead bullets of those days were distorted in the barrel. With the introduction, however, of the modern small-calibre bullet with its steel or nickel alloy envelope, the difficulty disappeared, and as the result of experiments with a variety of patterns, that just described was decided upon as giving the best results. The best diameter for the central channel was found to be about two-fifths of the actual calibre of the bullet. He determined, from experiments with this bullet in the German 7·9-mm. (0·311-in.) rifle, and in his own 5-mm. (0·197-in.) rifle, that for all velocities between 100 and 1,000 m. (328 to 3,280 f.s.) the resistance of the air was nearly proportional to the square of the velocity.

He points out that the penetration is diminished, but the trajectory is flatter, particularly at short and medium ranges, and the pressures and recoil are less; also, the ammunition being lighter, the soldier can carry more cartridges.

The only alterations to existing rifles which the use of these bullets entails are, the regraduation of the sights, and a slight increase in the length of the small cylinder of the chamber, owing to the extra length of the neck of the cartridge case, to enable it to grip the projecting ring of the bullet.

In order to compare the decrease in the resistance of the air, this resistance with the German rifle, Pattern 1888, may be represented by 1,000, 541, 216, and 89 respectively, according to which of the following bullets are used, viz.:—

1. The service bullet.
2. The service bullet with flat base and improved ogival point.
3. The service bullet with ogival base the same as the point.
4. The tubular bullet with ogival base and point.

With the 5-mm. (0·197-in.) rifle, the muzzle velocity being 750 m. (2,460 f.s.), these figures become 1,000, 463, 285, and 63.

The increase in the flatness of the trajectory will be seen from the following figures:—

At 1,000 m. (1,093 yds.), with the 11-mm. (0·433-in.) Mauser rifle, Pattern 1871, the danger zone is 20 m. (21·87 yds.). With the 7·9-mm. (0·311-in.), Pattern 1888, rifle and service bullet, it is 42 m. (46 yds.); with the same rifle and tubular bullet, it is 218 m. (238·4 yds.); and finally, with the 5-mm. (0·197-in.) rifle and tubular

bullet, it is 400 m. (437·4 yds.), or 20 times that of the Pattern 1871 rifle.

The following are some of the more important results given by Professor Hebler, of the experiments carried out by him:—

German Rifle, Pattern 1888.—The muzzle velocity obtained was 787 m. (2,582 f.s.), whilst that of the service bullet with the same charge (2·75 grm. (42·43 gr.) smokeless powder) is 640 m. (2,100 f.s.).; 182 cartridges weigh 4 kilos. (141 oz.), which is the weight of 145 service cartridges. The maximum pressure was 1,550 atmos. (10·2 tons per sq. in.); with the service bullet, it is 3,000 atmos. (19·7 tons per sq. in.). The penetration into pine was: at the muzzle, 117 cm. (46 in.); at 1,000 m. (1,093·6 yds.), 75 cm. (29·53 in.); at 2,5000 m. (2,734 yds.), 30 cm. (7·8 in.).

Hebler 5-*mm.* (0·197-*in.*) *Rifle.*—The muzzle velocity was 1,050 m. (3,445 f.s.), (797 m. (2,615 f.s.) with the ordinary bullet), with a charge of 1·64 grm. (25·3 gr.) of the Cologne Rottweil smokeless powder, normal charge being 15 grm. (23·15 gr.); 321 cartridges weigh 4 kilos. (141 oz.), which is the weight of 276 cartridges with the ordinary bullet. The maximum pressure was 2,400 atmos. (15·75 tons per sq. in.); with the ordinary bullet, it is 3,633 atmos. (23·85 tons per sq. in.). The penetration into pine was: at the muzzle, 204 cm. (80·32 in.); at 1,000 m. (1093·6 yds.), 143 cm. (56·3 in.); at 2,500 m. (2,734 yds.), 84 cm. (33 in.). The effective range was 5,234 m. (5,724 yds.); the total range was 9,172 m. (10,030 yds.).

MAGAZINE RIFLE TRIALS IN THE UNITED STATES.

Compiled by Captain F. L. NATHAN, R.A.

PARTICULARS of the trials of magazine rifles in the United States have appeared from time to time in the American papers and in foreign service periodicals, taken principally from the Report, dated 19th August, 1892, of the Board on Magazine Arms. The following are extracts from the Report of the Board, which was appointed in November, 1890, "to consider and recommend a suitable magazine system for rifle and carbine for the military Service." The Board was subsequently asked for an "opinion as to the relative merits of a magazine arm and a single loader for use in the United States Service."

The Board tested 53 different guns, including the service arms of Austria-Hungary, Belgium, Denmark, England, France (carbine), Germany, Japan, Portugal, Roumania, Russia, and Switzerland, the remainder being submitted by various inventors, foreign and American.

Before commencing the actual trials, each arm was subjected to a safety test of 10 rounds. The tests themselves were divided into two parts, viz., regular tests and supplementary tests, the rules for which were as follows:—

REGULAR TESTS.

I. *Rapidity with Accuracy.*

Piece to be fired from the shoulder at target, 6 ft. by 2 ft., range 100 ft., under following circumstances, cartridges disposed at will or in packets upon a table:—

(*a*) Time of firing and number of hits for 20 shots; magazine to be loaded before beginning test, and then held in reserve until remainder of cartridges have been fired, using gun as single loader, then firing those in magazine.

(*b*) Number of shots and hits, firing for two minutes, using gun as single loader; test begun with chamber empty.

(*c*) Number of shots and hits, firing for two minutes; test begun with magazine empty.

Any cartridge missing fire in this or other tests to be tried with a prick punch, or opened, to ascertain cause of failure.

II. *Rapidity at Will.*

Same as Test I, except that piece will be fired from the hip, without aim, at stop-butt at short range; hits not considered, and time of firing for parts *b* and *c* reduced to one minute.

III. *Endurance.*

(*a*) Each gun to be fired 500 continuous rounds without cleaning, using the magazine. The state of the breech mechanism to be examined at the end of every 50 rounds.

(*b*) With magazine loaded, but held in reserve; each gun to be fired as a single loader 100 continuous rounds without cleaning; condition of breech mechanism and of the cartridges in magazine to be examined at conclusion of firing.

IV. *Dust.*

With the mechanism closed, the piece to be exposed in the box prepared for that purpose to a blast of fine sand dust for two minutes, removed, surplus sand removed by blowing thereon and wiping with the bare hand, and then fired 20 rounds under the following conditions:—

(*a*) Magazine empty when exposed. Before firing, load magazine, fire balance of cartridges as a single loader, then those in magazine.

(*b*) Magazine loaded when exposed. Remove and wipe cartridges, reload, and fire as above.

V. *Defective Cartridges.*

Each gun to be fired once with each of the following defective cartridges: (1) cross-filed on head to nearly the thickness of the metal; (2) cut at intervals round the rim; (3) with a longitudinal cut the whole length of the cartridge, from the rim up. A fresh piece of white paper, marked with the number of the gun, being laid over the breech, to observe the escape of gas, if any occur.

VI. *Excessive Charges.*

The piece to be fired five times as a single loader, with cartridges in which the charge of powder is so increased as to produce a pressure in the chamber about one-third greater than that caused by the Frankford Arsenal experimental cartridge.

VII. *Ease of Manipulation.*

Facility of manipulation by members of the Board.

Any gun whose breech action or magazine system fails in any of the foregoing tests will not be submitted to further tests.

Supplementary Tests.[1]

I. *Defective Cartridges and Dust.*

(*a*) As a single loader: To be fired with two defective cartridges, Nos. 1 and 2, and then to be dusted five minutes, the mechanism

[1] To be applied only to such arms as have passed through the regular tests in a manner satisfactory to the Board.

being in the mouth of the blow-pipe and closed, but at full cock; then to be fired five shots, the last two defective Nos. 1 and 2; then without cleaning to be dusted with the breech open and fired five shots. The piece to be freed from dust only by pounding or wiping with the bare hand.

(*b*) As a magazine arm: Same as (*a*), except that the cartridges for the subsequent firing will be placed in the magazine before dusting, and fired therefrom afterwards.

II. *Rust.*

The breech mechanism, receiver, and magazine to be cleansed of grease, and the chamber of the barrel greased and plugged and breech action closed; the butt of the gun to be then inserted to the height of the chamber in a solution of sal-ammoniac for 10 minutes, exposed for two days to the open air, standing in a rack, and then fired 20 rounds, loading magazine and holding it in reserve until remainder of cartridges have been fired, using gun as single loader, then firing those in magazine.

III. *Explosions in Magazines.*

The liability to accidental explosion of cartridges in tubular magazines will be tested by charging the magazine, and then giving the gun a vertical jolting motion for two minutes, repeating with the magazine but half loaded.

IV. *Dismounting and Assembling.*

The comparative ease and relative time required in dismounting and assembling the breech and magazine systems of the different guns will be determined.

To further determine the comparative rapidity of fire and facility of manipulation of various guns, each gun will be fired 20 shots by three men to be selected by the Board, loading from the cartridge-box and firing from the shoulder, with aim at an "A" target, 100 yds. distant. The average of the three trials to be the recorded time of firing 20 rounds. The magazine to be loaded from the cartridge-box before the start, the remainder of the cartridges to be fired away first, using the gun as a single loader, and the magazine to be emptied last.

Such additional tests, or repetition of previous ones, as may seem advisable will be made by the Board in its discretion.

The following tables give the results of the tests of the service arms already referred to, and of the Krag-Jörgensen No. 5, which the Board recommended for adoption, a recommendation which was approved by the Secretary of War, 15th September, 1892.

In their Report, the Board divided the magazine arms examined by them into two general classes, dependent upon the manner in which their fire can be delivered.

First. Those which, while the magazine is charged, cannot be used as single loaders.

Second. Those in which the magazine can be charged and then held in reserve while single fire is delivered, magazine fire being however available at any moment.

The small-arms of Austria-Hungary, Germany, and Roumania are, the Board remark, typical of the first class; for them the cartridges are habitually carried in the ammunition trains and by the soldier in packets of five, the packet being introduced bodily into the magazine. Typical of the second class are the small-arms of Denmark, England, and Switzerland. With the best developed of this class the cartridges are carried by the soldier, both singly and in packets, the latter being employed to facilitate rapid charging of the magazine, though not essential thereto.

Country and name of rifle.	I. Rapidity with a								
	(*a.*) For 20 shots.					(*b.*) As single-loade			
	Shots as single-loader.	Shots from magazine.	Hits.	Time.	Remarks.	Shots.	Hits.	Remaining in chamber.	
				secs.					
England, Lee-Metford I, 1889	12	8	18	49	17″ for shots in magazine	49	39	..	
Denmark, Krag-Jörgensen, 1889	15	5	18	55	11″ for shots in magazine	42	37	..	
Austria, Mannlicher, 1888–90	15	5	18	54	12″ to charge and fire magazine	38	34	..	Nint de
Belgium, Mauser, 1889	16	4	20	69	6″ for shots in magazine	31	30	..	Sixt
Germany, Pattern 1888	15	5	20	91	14″ to charge and fire magazine	28	26	1	Seco
Portugal, Kropatschek, 1886	12	8	19	140	50″ for shots in magazine. Difficult to operate	24	18	..	Muc op
Japan, Murata	12	8	15	58	21″ for shots from magazine	36	35	..	
Switzerland, Schmidt-Rubin, 1889	8	12	16	56	28″ for shots from magazine	31	25	..	
Austria, Carbine, Mannlicher, 1890	15	5	16	59	13″ to charge and fire magazine	38	35	..	
Roumania, Mannlicher, 1892	15	5	19	52	12″ to charge and fire magazine	41	38	..	
France, Berthier, 1891	16	4	16	59	11″ for shots from magazine	38	26	..	Thir
Krag-Jörgensen, No. 5 (The arm eventually adopted by the Board)	15	5	16	54	10″ for shots from magazine	38	35	1	

ith accuracy.

-loader for 2 minutes.	(*c.*) As magazine gun for 2 minutes.				(*a.*) For 20 shots.			
Remarks.	Shots.	Hits.	Remaining in chamber.	Remarks.	Shots as single-loader.	Shots from magazine.	Time.	Remarks.
							secs.	
..	17	16	7	..	12	8	38	11″ for shots from magazine
..	35	24	5	Second trial	15	5	37	7″ for shots from magazine
Ninth trial; ammunition defective	49	45	1	..	15	5	40	9″ to charge and fire magazine
Sixth trial	36	34	4	Second trial	16	4	51	5″ for shots from magazine
Second trial	24	23	1	..	15	5	69	11″ to charge and fire magazine
Much force required to operate	16	16	5	Much force required to operate	12	8	120	42″ for shots from magazine
..	24	21	1	..	12	8	38	13″ for shots from magazine
..	37	32	8	One cartridge left in chamber	8	12	38	18″ for shots from magazine
..	40	27	..	Fourth trial; worked stiffly	15	5	48	11″ to charge and fire magazine
..	48	48	2	..	15	5	40	6″ to charge and fire magazine
Third trial; 10 missfires..	..	..	..	Test not completed in eight trials				
..	43	48	..	One cartridge in chamber	15	5	39	7″ for shots from magazine

SUPPLEMENTARY TESTS.

Country and name of rifle.	Defective cartridges and dust.		Rust.
	(*a.*) Single-loader.	(*b.*) Magazine arm.	
Denmark, Krag-Jörgensen	Worked well and easily	Mechanism worked well	Mechanism worked well stiffly.
Austria, Carbine, Mannlicher	Mallet required to manipulate bolt		
Roumania, Mannlicher	Mallet occasionally required to manipulate bolt; worked very stiffly	Mallet occasionally required; worked stiffly	Mechanism could not be
Krag-Jörgensen, No. 5	Worked well	Worked well	Mechanism could be w stiffly.

Synopsis of Tests of Service Magazine Rif

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s.	II. Rapidity at will.							
	(*a.*) For 20 shots.				(*b.*) As single-loader for 1 minute.			(*c.*)
	Shots as single-loader.	Shots from magazine.	Time.	Remarks.	Shots.	Remaining in chamber.	Remarks.	Shots.
			secs.					
	12	8	38	11″ for shots from magazine	28	..	..	11
.. ..	15	5	37	7″ for shots from magazine	28	..	Slight delay to close magazine gate	25
	15	5	40	9″ to charge and fire magazine	..	..	Omitted; lack of suitable ammunition	..
.. ..	16	4	51	5″ for shots from magazine	18	..	..	21
	15	5	69	11″ to charge and fire magazine	18	1	..	20
ired to	12	8	120	42″ for shots from magazine	17	..	Bolt opened with difficulty	13
	12	8	38	13″ for shots from magazine	25	1	..	16
left in	8	12	38	18″ for shots from magazine	18	..	..	25
worked	15	5	48	11″ to charge and fire magazine	25	..	..	37
	15	5	40	6″ to charge and fire magazine	23	..	..	40
ted in								
hamber	15	5	39	7″ for shots from magazine	29	1	Third trial	35

NTARY TESTS.

es and dust. (*b.*) Magazine arm.	Rust.
Mechanism worked well	Mechanism worked well, but rather stiffly.
Mallet occasionally required; worked stiffly	Mechanism could not be operated.
Worked well	Mechanism could be worked, but stiffly.

Rifles by the United States Board on Magazine Arms.

REGULAR TESTS.

III. Endurance.								
(*c.*) As magazine gun for 1 minute.			(*a.*) As magazine gun.		(*b.*) As single-loader.			
Shots.	Remaining in magazine.	Remarks.	Shots.	Remarks.	Shots.	Remarks.		
11	5	..	500	Magazine spring broke on 188th round; carrier clip broke on 490th round	100	Bolt opened stiffly; mallet required at end of test		
25	5	Second trial	500	Ejector spring broke on 5th round	100	Mechanism worked easily ..		
..	..	Omitted; lack of suitable ammunition	100	9 failures to extract; 9 missfires, occasioned by defective ammunition	..	..		
21	..	Third trial; one missfire..	500	17 failures to extract; 2 missfires	100	4 failures to extract; 3 missfires		
20	..	Ammunition packet half introduced	500	Much force frequently required to force cartridges from loading packet	100	Test conducted with magazine empty		
13	3	Bolt opened and closed with difficulty	500	Blows from hammer frequently required to operate bolt	100	Blows from hammer frequently required to operate bolt		
16	..	..	500	Failures to eject, 4; to extract, 2; to properly feed from magazine, 19; missfires, 11	100	..		
25	11	Second trial	500	49 failures to extract	100	5 failures to extract ..		
37	3	..	100	Not sufficient ammunition to complete test	..	Test omitted; lack of ammunition		
40	..	..	500	Worked well and easily	100	Worked well and easily ..		
35	1	..	500	Worked well and easily	100	Worked well and easily ..		

ADDITIONAL TESTS (20 shots

Country and name of rifle.	Average of the results of firing men, loading from cartr			
	Single-loading fire.		Magazine	
	No. of shots.	Time of firing.	No. of shots.	
Roumania, Mannlicher	15	1′ 42″	5	
Krag-Jörgensen, No. 5	15	1′ 24″	5	

rms.

	I. Endurance.		IV. Dust.			
	(*b.*) As single-loader.		(*a.*) Magazine empty when exposed.		(*b.*) Magazine loaded w	
	Shots.	Remarks.	Shots.	Remarks.	Shots.	Rema
88th e on	100	Bolt opened stiffly; mallet required at end of test	20	Bolt dry; worked very stiffly ..	20	Mallet required to rier and spring f
ound	100	Mechanism worked easily	20	Worked freely	20	Bolt opened a li worked well
fires, nmu-	..	..	20			
fires	100	4 failures to extract; 3 missfires ..	20	Mechanism completely clogged; dismounted and cleaned	20	Bolt worked stiffly
uired ading	100	Test conducted with magazine empty	20	Single-loading fire held with magazine empty	20	Single-loading fire zine empty
ly re-	100	Blows from hammer frequently required to operate bolt	..	Breech and magazine mechanism too much clogged to fire		
ct, 2; azine,	100	..	20	Mechanism worked with great difficulty	20	Last cartridge fro fed into receive
..	100	5 failures to extract	20	Worked stiffly	20	Worked stiffly
com-	..	Test omitted; lack of ammunition	20	Difficult to entirely close bolt; worked stiffly	20	Worked very sti entirely close bo
..	100	Worked well and easily	20	Mechanism at first worked stiffly ..	20	At first required a mechanism
..	100	Worked well and easily	20	Worked freely	20	Worked freely

ADDITIONAL TESTS (20 shots with aim at A target—range 100 yds.).

of rifle.	Average of the results of firing by three enlisted men, loading from cartridge belt.					Remarks.
	Single-loading fire.		Magazine fire.		Average of the total time for firing 20 shots.	
	No. of shots.	Time of firing.	No. of shots.	Time of firing.		
, r	15	1′ 42″	5	23″	2′ 5″	Men unfamiliar with action of both guns, and manipulated them awkwardly and slowly.
, No. 5	15	1′ 24″	5	26″	1′ 50″	

...ded when exposed.		V. Defective cartridges.		VI. Excessive charges.	
...Remarks.	Shots.	Remarks.	Shots.	Remarks.	
...red to open bolt; carrying failed to work	3	Extractor spring broken; carrier forced to bottom of magazine	5	Bolt opened with difficulty; bolt head-screw loose.	
... a little stiffly, but ...ll	3	No injury whatever	5	Bolt opened freely; worked well.	
...stiffly	2	Extractor bent; bolt could not be opened			
...g fire held with maga...	2	Ejector and firing pin broken and blown to rear			
...ge from magazine not ...ceiver	3	No injury whatever	5	Bolt moved with difficulty; ejector weak.	
...ly	1	Magazine box broken and blown from gun	..	Test omitted.	
...ry stiffly; difficult to ...ose bolt	3	No injury whatever	5	Bolt opened freely; worked well.	
...ired a mallet to operate ...n	3	No injury whatever	..	No proper ammunition available.	
...ely	3	No injury whatever; mechanism worked well	5	Bolt opened freely; worked well.	

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THE RUSSIAN NAVY.

Translated, by permission, from "La Vie Contemporaine" by Commander H. GARBETT, R.N.

As a Russo-French alliance and the state of the Russian Navy has a good deal occupied the attention of the English Press and expert writers during the last three months, it may interest some readers of the Journal to learn the views of a French naval officer, a well-known writer on naval matters, on the present fighting value of the Russian fleet. On one point in his paper, however, I do not think that many officers either in England or of foreign countries will be found to agree with him, viz., that the Russian Black Sea fleet, in consequence of Treaty regulations, may be looked upon as "une quantité négligeable" in reckoning possible combinations.—H. G.

In consequence of her extensive coast line, and of the fact that her maritime frontiers are far apart from each other, Russia is obliged to maintain four fleets, each having its own distinct personnel and matériel, viz.: the Baltic, Black Sea, Caspian, and Siberian fleets.

Since the visit of the Russian squadron to Toulon, every Frenchman has been asking, "What is the composition, what is the strength, and what is the real value of the Russian naval forces?"

In order to reply to these questions, I shall content myself with an examination of the ships possessing any fighting value, and shall omit the numerous vessels without protection or speed, which the Russian Admiralty, following the example of other naval Powers, maintain for special service in times of peace, but which, on the outbreak of hostilities, will be prudently consigned to the shelter of harbour. In a word, I shall only cite those ships which are fit to fall into line in case of war.

I. *The Baltic Fleet.*

Six sea-going battle-ships.—One of these, the double-turret ship "Peter Velikie," dates from 1872, and has only a speed of 14 knots, but the five others are of quite recent construction (1887—1892), have a speed of 16 knots, and are heavily armoured and carry powerful armaments.

Nine armoured cruisers.—One of these, launched in 1867, ought scarcely to be counted under this head, as she is deficient both structurally and in speed according to modern ideas; of the remaining eight, five are of a very moderate speed, so that there remain only three, the "Rurik," "Admiral Nakhimoff," and "Pamyat-Azova," which are fully equal to all the exigencies of modern naval war.

20 armoured coast-defence ships.—All these ships are old, dating

from 1863 to 1868. Their speed is small and armour protection weak.

Three armoured gunboats.—These are quite new, steam 15 knots, and are heavily armed.

Two protected cruisers.—These vessels have an armoured deck, which protects their vitals; one, the "Rynda," has a speed of only 15 knots, but the other, the "Admiral Korniloff," steams 18·5, a speed sufficient to make her useful as a cruiser.

Three torpedo-cruisers.—All new vessels, with a speed of from 20 to 22 knots.

27 torpilleurs-de-haute-mer.—Their speed varies from 19 to 25 knots; they are nearly all of them excellent boats for their work.

94 1st and 2nd class torpedo-boats for coast defence.

II. *The Black Sea Fleet.*

Five sea-going battle-ships.—All are modern ships, the oldest having been launched in 1886; they are vessels of a very formidable type, heavily armoured, and carrying a peculiarly heavy armament, and all have a speed of from 16 to 17 knots.

Two armoured coast-defence ships.—These are the celebrated circular vessels, known as the Popoffkas.

Two torpedo-cruisers.—These are modern vessels; one has a speed of 18·5, the other of 21 knots.

16 torpilleurs-de-haute-mer.—Their speed varies from 18 to 22 knots; but the latest, the "Adler," built last year by the Schichau firm at Elbing, attained a speed of 26·5 knots.

Two torpedo-transports.—These vessels, unfortunately, are of slow speed.

Seven 1st class torpedo-boats for coast defence.

III. *The Siberian and Caspian Flotillas.*

In Siberia Russia has a small squadron, consisting of 4 gunboats, 4 torpilleurs-de-haute-mer, and 6 torpedo-boats for coast defence. On the Caspian are 2 gunboats and some small steamers, which are for patrol and police duty.

IV. *Vessels in course of Construction.*

To the preceding vessels, all of which are ready for sea, or very nearly so, must be added the ships which are not yet complete, but which will before long be added to the effective strength of the Russian naval forces. In course of construction in the different yards on the Neva are 4 1st class battle-ships, 2 coast-defence battle-ships, and 5 torpilleurs-de-haute-mer; 2 armoured cruisers of an improved "Rurik" type have just been laid down, and another battle-ship is to be also immediately commenced, as well as 2 torpedo-cruisers and 8 more torpilleurs-de-haute-mer. In the Black Sea dockyards one 1st class battle-ship, the "Three Saints,"

has lately been launched, and two more are to be laid down as early as may be, while a torpedo-cruiser is approaching completion. All the battle-ships will be heavily armoured, powerfully armed, and have a speed of 17·5 knots.

The above classification may be called the geographical grouping of the Russian Navy, and it may be interesting if we now place the different elements in tactical order, so that it may be seen at a glance what efforts Russia will be capable of making at the present time in the event of a naval war. In the first table we shall give the number of ships of the offensive fleet, or the 1st line; in the second, the defensive fleet, or 2nd line. The first table will thus give the fleet which will be able to put to sea to act on the offensive, the second the strength of the fleet for defence of the coast.

The Fleet of the 1st Line.

In the Baltic: 5 battle-ships, 3 armoured cruisers, 2 protected cruisers, 3 torpedo-cruisers, and 27 torpilleurs-de-haute-mer.

In the Black Sea: 5 battle-ships, 6 1st class gun-vessels, 2 torpedo-cruisers, and 16 torpilleurs-de-haute-mer.

Fleet of the 2nd Line.

In the Baltic: 1 battle-ship, 20 armoured coast-defence ships, 6 armoured cruisers, 11 2nd class cruisers, and 90 coast-defence torpedo-boats.

In the Black Sea: 2 coast-defence battle-ships and 7 coast-defence torpedo-boats.

Of the Black Sea fleet it is hardly necessary to speak, as at present its radius of action is confined to that sea, and, should it be wished to send it into the Mediterranean, it would probably have to force a passage through the Bosphorus and Dardanelles, as the Turks jealously refuse the right of passage to ships of war. In case of war, then, these Straits would have to be forced, and, putting Turkey on one side, the Russian ships would probably find themselves face to face with a certain powerful navy, which is pleased to consider itself as the guardian of the passage into the Archipelago. Will Russia, then, play this great game? We may be permitted to doubt it.

The Baltic fleet, then, is the only one which can be regarded as the active fleet of Russia, as its European fleet in fact; and it is with this alone, then, that we have to deal. The proportion of the different units which compose it is satisfactory; the number of cruisers in ratio to the battle-ships is good, and that of the torpilleurs-de-haute-mer high. With regard to the coast defence and other vessels of the second line, they make up a presentable force.

Selecting among the torpilleurs-de-haute-mer those having the highest speed, the heaviest tonnage, and a suitable armament (the bulk of the Russian boats carry two 37 mm. Q.F. guns, steam 21 knots, and are over 100 tons displacement), it will be easy to attach

to each of the five battle-ships two "contre-torpilleurs," which is the least number considered indispensable for every battle-ship forming part of a squadron. As scouts the eight cruisers which figure in the preceding table would be employed, and in this way a fighting homogeneous squadron sufficiently rapid and sufficiently protected against an enemy's projectiles would be constituted.

If, however, we subtract from this squadron, as has been done, a battle-ship and three cruisers in order to form the Naval Division in the Mediterranean, it will be materially reduced, and there are some who will be of opinion that the Russian Government would have been well advised if it had given up the idea of organizing this division in a sea where it is not obliged to take action and had retained its whole forces in the waters of the North, where they could play a very active part against one of the Navies of the Triple Alliance.

To this criticism the reply is possible, that the inconvenience we have pointed out will gradually diminish in the future in proportion as the new fighting units leave the Russian dockyards. Thanks, in effect, to these future units, it will not be long before Russia will have sufficient forces to play not only its rôle in the North, but also to provide a strong division for the Mediterranean.

If this division is one day to co-operate with us we have a right to demand that it shall be constituted in the form most useful for ourselves. At the present time, for example, our squadrons are short of cruisers, or, rather, they are less abundantly provided with scouts than they ought to be. Under these circumstances it would be better for the Russian squadron to consist only of cruisers. The battle-ship is not required, as we have more of them in the Mediterranean than the Austrians and Italians combined, so that a cruiser in place of the "Emperor Nicolas" would be doubly welcome.

With regard to the rôle of Russia in the North I do not think that I need say more. If circumstances call for their support it is not necessary to be a great strategist to see that her natural mission will be to paralyse the German forces.

But in our satisfaction at feeling ourselves no longer isolated in Europe, but the friends of a great nation, we must not lose sight of the weak point in these attractive combinations; for the six winter months the Baltic is closed by ice and all navigation suspended between November and April. If war, then, is declared in March the Russian battle-ships, cruisers, and torpedo-boats will be immovable at Cronstadt, and the German forts and squadron will have nothing to fear from their assault. This annual immobility of the fleet will come to an end it is true when Libau, where for the last five years great harbour works have been carried out (an immense basin, among other things, 5 km. square and with a depth of 32 ft., is being constructed), shall have become as important, as complete, and as well fitted out an arsenal as Cronstadt. The roadstead of Libau, situated in Courland at the southern extremity of the Russian Baltic coasts, possesses the great advantage over Cronstadt of never freezing over in winter.

When the new arsenal with its docks, building slips, &c., is com-

pleted the maritime power of Russia will be much enhanced; she will be able to enter the lists at any time of the year. She will then not only have "a window overlooking Europe," as Peter the Great demanded when he wanted to drive the Swedes out of Finland, but a real doorway by which she can leave whenever she wishes. On that day it will be possible to count with certainty on her action in the North when the movements of her squadrons is no longer subject to the caprice of the seasons.

It is an incontestable axiom that war in the future will proceed by rapid and decisive blows. So efforts are made in all navies to assure the prompt readiness for action of the fleets, above all of the fleets of the first line. This readiness for action is a quality of such first importance that I might mention a certain navy of the Triple Alliance which, in spite of the excellence of its material, remains in a state of manifest inferiority, because the means have not been found of concentrating rapidly in its ports the personnel necessary to commission fully the powerful and fast ships of its first line.

In this respect the Russian Navy is favourably situated. In order to place the first and second lines of the Baltic fleets on a war footing, 10,000 men are required, and 3,500 men for the same purpose in the Black Sea. But, in the groups of personnel organized in the ports, under the name of "équipages," there are now in the Baltic, 18,000 men—not including the "équipage de la Garde," which numbers 2,000 men,—and 6.000 men in the Black Sea. There is, therefore, a considerable margin over the numbers necessary for completing the personnel of the ships which have been classed under the heading of fighting ships.

All the details and preceding considerations refer only to squadron warfare. If circumstances compel Russia to enter upon a cruiser warfare, it is necessary to admit that the number of cruisers capable of preying upon the merchant ships of the enemy will be much reduced. Among the vessels, which are neither armoured or protected, we find that the speed only averages between 12 and 14 knots, which makes them quite incapable of chasing 15- or 16-knot mail boats, which are not the most rapid of the commercial fleets.

It goes without saying that a certain number of fast mail boats could be requisitioned in time of war, to serve as auxiliary cruisers against an enemy's commerce. Russia possesses an organization peculiar to itself (there being nothing similar to it in other countries), which assures to it, in case of need, some excellent auxiliary cruisers. This institution is its volunteer or patriotic fleet, the creation of which dates back to the preliminaries of the treaty of Berlin, when it was feared that England would declare war with Russia. A national subscription, headed by the name of the Hereditary Grand Duke (the present Czar) collected in a few days so important a sum as to enable them to acquire seven mail steamers.

This volunteer fleet has for its duty the transportation of matériel and personnel of the State between Odessa, Vladivostock, and

Saghalien, and is subsidized by the Government; moreover it has the privilege of manning its mail boats by officers and men belonging to the list of the Imperial navy. It is, therefore, in a measure a mixed fleet, half merchant and half naval. But in spite of these intimate bonds with the State, it preserves a character of private industry. It trades with all the ports situated on its route, and has acquired the first place as importer of tea from China. Its profits are now considerable.

Encouraged by the excellent results that have followed, the Russian Government have decided that the special fleet shall be notably augmented; to the seven ships they had, two new ones have already been added, and shortly their number will be increased by eleven other vessels, which will steam 20 knots, and which, constructed with a view of being eventually used as war ships, will be able at a short notice to be transformed into auxiliary cruisers as soon as the political horizon assumes a dark outlook.

This survey of the Russian Navy would be incomplete if we did not speak of the military ports of Russia. They are 12 in number: five of the first class, Cronstadt, St. Petersburg, Nicolaïef, Sebastopol, Vladivostock; and seven of the second class—Sweaborg, Revel, Archangel, Baku, Batoum, Nicolaïefsk (on the river Amour), Kagala (on the Oxus). Lastly, quite recently the port of Libau was inaugurated as a fortified harbour with an *éclat* which proves the importance of this new maritime centre.

The Russian harbours are for the most part very strongly fortified. The coast defence of the Baltic is under organization. On this sea (the difficult access to whose coast forms a natural defence) the places most strongly fortified are Dünamünde, Cronstadt, Wiborg, and Sweaborg. Cronstadt is impregnable. We proved this ourselves in 1854 and 1855. We were unable to do anything against the place, and at the present moment with its cross-fire and armoured forts overlooking a narrow, winding canal, 29 kilomètres in length, Cronstadt can defy all bombardment. In the Black Sea, Sebastopol has been newly fortified. Kertch and Yenikale are also strong; Nicolaïeff, Kinburn, Otchakoff are surrounded by numerous defensive works; Azov, Batoum, and Poti are being provided with heavy guns.

The ships of the Russian Navy are built at St. Petersburg, either at the Works of the New Admiralty, or at the Baltic Works, which latter although a private yard, is fast becoming the entire property of the State. In Finland, at Abo, the navy possesses an important yard for the construction of small ships and good torpedo-boats. At Cronstadt there are only shops for repairing and fitting out; but on the other hand, at Nicolaïef, there are the Imperial building yards of the first importance.

The private yards build also for the navy. Amongst the most active are the Franco-Russian Works, which are altogether French and which have built battle-ships and cruisers, amongst others the "Emperor Nicolas" and the "Rynda," which are now in Admiral

Avellan's squadron, and also the works of the Black Sea Company, situated at Sebastopol. Besides the works on the Neva, the Pontiloff and Tjora yards frequently execute orders for the State.

The Russian Government has occasionally applied to the French workyards; the cruiser "Admiral Korniloff," one of the best of the Russian ships, was built at the Loire building yard, and a large number of torpedo-boats were ordered from M. Normand, the constructor at Havre. Other torpedo-boats come from the "Schichau" yards in Germany, who turn out excellent work. One must not draw any unfavourable conclusion as to Russian industry on account of these dealings with strange building yards. In effecting them the Government of the Czar simply wished to acquire models, either to reproduce or imitate. But the Russian building yards are in perfect working condition (although the cost of production is relatively high); the ships launched by them will bear comparison with those of the first navies in the world. A last detail will finish the characterization of the progress of Russian industry. Until within the last few years the navy was indebted to the Krupp Works for their artillery matériel, now they turn out their own guns at the national works of Oboukhoff, and these are excellent.

Such is the navy of Russia. There are not yet a sufficient number of ships nor an efficient reserve, but an immediate future will provide them. She is, in fact, in a state of rapid development. If she follows the movements of foreign navies, and profits by the innovations and perfections realized by them, she is still far from wanting in the initiative. She was the first in 1855, during the Crimean War, to use torpedoes, which were then called Jacobis, from the name of their inventor, one of which did vast damage to the English ship "Merlin." She was one of the first to build monitors for her squadrons. She studded her coasts in good time with armoured forts. She was very nearly the initiator in the employment of "torpilleurs-de-haute-mer." Lastly, quite recently she took the lead in building cruisers of a great tonnage, which will perhaps be one of the greatest features in the naval warfare of the future.

This vitality is undeniably a sign of great force. In this century of incessant conquests of industry and science, a navy, to increase, must go with the times. This is what the Russian Navy is doing.

However, even with matériel of the first order, even with a fleet powerfully armed, combining force, protection, and speed, these three primary factors of modern warfare, a navy cannot be certain of fulfiling the high destinies for which it has been prepared.

"Tant vaut l'homme, tant vaut la terre," is the saying of peasants; "Tant vaut l'homme, tant vaut la flotte," sailors may say.

In Russia a sailor has not as much practical exercise in his profession as one could wish. Taken from his village in the interior of the Empire, he is often only a soldier living in barracks during the greater part of the year, and serving at sea for only a few months when the Baltic Squadron is commissioned after the breaking up of

the ice. He is trained in military exercises, but the feelings of a sailor, which can only come by being accustomed to the sea, are generally wanting. It remains, however, to be seen, on these modern ships where all trace of sail has disappeared and everything is sacrificed to the machinery for fighting the ship, whether the Russian sailor may not prove sufficiently efficient. Moreover, it must not be forgotten that the conditions will be much changed with the opening out of the port of Libau. There will not be seen, as there were at Cronstadt, numbers of ships abandoned during the six months of winter. Thanks to the future arsenal, which will become the principal station for the Baltic fleet, and which is in reality the future of the Russian Navy, the sailors will get the constant practice afloat which they have wanted so much up to the present time.

The officers, on the other hand, have always found in the course of their career plenty of occasions for practising navigation, and for acquiring the necessary nautical knowledge and experience. They merit the epithet of seamen, which, in the language of our sailors, includes all the indispensable qualities. They are, moreover, well instructed in everything which concerns the different branches of their profession.

We can render complete homage to the courage of both officers and men. We know, moreover, since the glorious defence of Sebastopol, how to value their energy. Courage and heroism are traditions with them. They have proved this once again in their exploits during the last war with Turkey.

NOTES ON THE ENGLISH NAVAL MANŒUVRES OF 1893.

(Translated from the "Rivista Marittima" of January, 1894, by T. J. Haddy, R.N.)

We have given a simple narrative of the facts as they occurred during the evolution of the operations, so far as it is possible to do so from the various sources of information at our disposal, often incomplete and discordant amongst themselves, and we may be allowed to add to this narration the few following considerations.

The sudden and unexpected manner in which the Admiralty prematurely put an end to the operations has certainly given cause for the conclusion that the general course of these operations was not altogether satisfactory to that body, and did not furnish to the council of umpires the absolute data necessary to establish with certainty whether these manœuvres had fulfilled or not the tactical and strategical object for which they were designed. In examining into the account which we have compiled, it is evident that neither in the carrying out of the different operations, nor in the general or partial encounters which took place, did anything of importance occur which is worthy of special remark. Even the principal and most important part, relating to the service of exploration and communication of orders, on which the Admiralty expected to obtain certain and practical information, did not give, on the whole, any results from which any practical plan of operation could be traced out for future guidance. In fact, if this service had been arranged with order and foresight, and if any proper and uniform rule had guided it, the A and C Fleets would not have suddenly encountered each other, and the latter would not have been exposed to an action against a superior force, an action which would have been fatal to it had not a fortunate fog miraculously afforded a means of escape; in the same way, if A Fleet had been well informed it would have been able to effect its object at an opportune time, and effect a junction with B Fleet under more favourable conditions. None of the scouts gave timely notice of the presence of the two fleets to the whole of the force; so that with the given conditions of speed, &c., with which they were constituted, the action could not have been avoided by one side or the other, had it wished to do so.

The general action which followed the encounter did not furnish any data of practical utility, and this might always be logically expected in a sham fight carried out with precise and well studied rules, which, however, cannot possibly foresee all the circumstances of real warfare. Certainly the encounter of two large fleets, well constituted and manœuvred with ability, always affords an imposing spectacle, and one which, by leaving to the spirit the tranquillity due

to the known absence of danger, permits it to take up all sorts of fantastic delusions, and to concede to the whole result an appearance of truth which it has not in reality, and a tactical and strategical importance which it never can possess. The period which followed this first action was occupied with elementary matters not calling for minute examination. It is, however, worthy of note that during the eight days of incessant manœuvring of large numbers of ships, no accident had to be deplored as a result of false manœuvres or mistakes of the officers in command. Some people, by examining into the facts partially as they occurred, have thought it necessary to make a special point of, and to raise a cry of alarm about some chance encounters which took place between the torpedo-boats and the ships of their own side. Certainly it would be fatal if this should occur in real war, and for this reason it is an indispensable duty for us to study the best means of avoiding these accidents, but it is useless to make them the basis of unjustifiable arguments; at the same time, it must be admitted that those who will be called upon to lead ships and torpedo-boats into action must possess great powers of intuition, and much knowledge of the characteristics of their own and the enemy's ships, and that the superior officer in charge of the operations should endeavour to employ his ships and torpedo-boats so as to avoid these unfortunate encounters as much as lies in his power, and which will naturally be much more likely to happen during manœuvres with ships of the same flag than when the ships engaged belong to different nations. It is therefore evident that a close study of the peculiarities of foreign ships, and a perfect acquaintance with their characteristics, is of the utmost importance for naval officers, a study which must be persistently kept up, and in which no detail should be neglected, whether of material, general aspect, or exterior form.

The torpedo-boats fulfilled their mission in a most praiseworthy manner, and again proved how important they may become in a future war when they are rationally employed on the defensive near the coast, and not made to do the work of scouts, &c., or to run after a fleet operating in the open sea. Already in this journal it has been frequently asserted that the defence of the coast is the proper field of action for torpedo-boats, and in this their special field they are most efficient for intercepting and frustrating the work of the enemy's fleet, and on the other hand for assisting the ships of their own side by covering, supporting, and seconding their efforts in action. The faster, more autonomous, and capable of keeping the sea the torpedo-boats are, the larger will be their range of action, and the more numerous the operations with which they may be entrusted; but it must not be forgotten that the coast and not a fleet or single ship must be the base from which they act. Naturally I speak only of torpedo-boats pure and simple, and not of those carried on board ship, whether large battle-ships or those specially adapted for this purpose. Depôt ships like the "Vulcan" in England, or the French "Foudre," with proper rules and precautions, may accompany a fleet in operation and under certain conditions may be able to use the small torpedo-boats they

carry with advantage, but torpedo-boats carried on board battle-ships would be more likely to be the cause of serious encumbrance, and to be knocked to pieces at the first encounter with the enemy, than to render any useful service whatever. It is necessary to disencumber and simplify modern fighting ships as much as possible, and the problematical success of an insidious attack by stratagem, which is the only service for which these torpedo-boats could be employed, does not in our opinion counterbalance the serious disadvantages above mentioned; as regards their usefulness or otherwise, the torpedo-boats carried on board ship may be considered as belonging, more or less, to the same category as the torpedo net defences. High speed and autonomy, simple, strong, and readily workable armament, free decks, and as few auxiliary fittings as possible, are the principal elements which go to form an efficient and practical fighting ship. Returning to the torpedo-boats, we need not occupy ourselves with an examination into the various tactics and stratagems invented and employed for the purposes of attack and eluding the vigilance of the enemy's ships, at sea and in harbour, as no decisive rules or information could be deduced from what was done during the manœuvres, for the reason that such operations are dependent on the conditions of the particular war in which they are undertaken, to the locality, to the elements employed, and very largely to chance circumstances for which as yet no one has been able to legislate.

This being granted, and leaving out of the discussion the tactical and strategical teaching which the exercises did *not* furnish, we will pass on to examine the tactical and practical lessons which they have afforded. In the first place, the replenishment of fuel at sea was an experiment which was carried out with very successful results; the same system was found equally satisfactory in harbour, and considered more convenient and quicker than the method hitherto in use. The system employed was invented by Mr. Temperley, and consists of a kind of traveller formed of a T-bar suspended in a convenient position between the ship and the coaling vessel, and on which the coal basket or hopper is run to and fro, being raised and lowered by means of a steam winch and wire rope purchase, the whole operation being performed by the man at the winch only.

It is reported that in favourable circumstances 50 tons of coal could be transported from the collier to the ship in one hour's uninterrupted work, and with a very limited number of men. It can easily be understood that with a suitable number of these fittings, the bunkers of the largest ships could be filled in a very short time; it was used when running at a speed of 10 knots with the greatest success, and it was found possible to replenish many of the ships of the fleet in a very short time without the necessity of reducing speed, changing the formation, or interfering with the efficiency of the look-out arrangements. It was also found possible to replenish the torpedo-boats at a speed of over 10 knots, at the same time keeping them at a convenient distance from the side of the collier to prevent damages.

With respect to this question of replenishing the bunkers we may notice that experiments have also been carried out by the United

States Navy with the "Kearsage" and "San Francisco"; the latter ship taking the part of the coaling ship. The "Kearsage" was towed by the "San Francisco," at a convenient distance, and a hawser was suspended from the mizen of the latter to the foremast of the former, kept taut and elastic by means of counterweights; the coal was transferred from one ship to the other by means of a runner and hauling lines, the sacks of coal being suspended from the runner and the hawser inclined, so that the loaded sacks would run down by their own weight, when they were brought up by buffers formed of coils of ropes, &c. The idea is simple enough, but from what we have heard it does not appear to have given very satisfactory results, as the ships have to be a considerable distance apart, and this distance is always liable to be increased by the state of the sea; even in the most favourable circumstances it was only possible to transfer about 4 tons of coal in an hour.

To return to the English manœuvres we may notice that many accidents occurred during the period of mobilization, and also during the hostilities; but we must also note, that although the ships in the reserve should be considered ready, it is not possible to avoid some accidents and defects occurring in bringing together some 84 ships of the most different types and qualifications. The fact deserves mention also that in spite of accidents and defects, some of them of considerable importance, they were either repaired or otherwise so remedied that the ships were all enabled to join their respective fleets at the opening of hostilities, and remained efficient during the whole period of action.

We have at other times in this Journal discussed the vital question of the choice of the various types of ships and their mode of employment as imposed by the special necessities of the case for each nation, and the operations above referred to have confirmed the judgments and opinions we then expressed. With regard to ships of the line, without entering into a discussion as to whether it is better to have them of 1,000 or 1,400 tons displacement, whether ships constructed to fight with the ram should be preferred, or whether complete or partial armour-belts are necessary, we may remark that the English manœuvres have shown that ships with a considerable height of freeboard are to be preferred. The ships of the "Royal Sovereign" class showed themselves superior to those of the "Admiral" class, which have a low freeboard forward and aft, and which makes it difficult if not impossible for them to use their guns when steaming against a head sea. This was so evident that many officers strongly advocated that the 68-ton guns should be replaced by lighter ones, so as to relieve the extremities of these ships of the heavy weights. On account of this question of the increased elevation of the heavy guns above water, the barbette system has been preferred to the closed turrets, although the protection afforded by the latter is somewhat superior; the reduction of the weight of the heavy guns, however, has so many and obvious advantages to recommend it, that there was no need of the experiences of the manœuvres to emphasize the fact. With regard to the cruisers, we

repeat that they should on no account be confounded with exploring ships, that is with those which up to the present have been commonly known as scouts (avvisi); the cruiser is a ship essentially adapted for fighting, whilst the scouts should only fight under certain conditions and in special circumstances. The scouts, or "avvisi," are designed for exploring services and for communication, and should have a very high speed and sufficient displacement to enable them to keep the sea in bad weather; to us it appears useless to think of loading them with armament, or providing them with the protection of an armoured deck, they should be good sea boats, steam well in heavy weather, and possess considerable autonomy. For their armament they should have a certain number of small quick-firing guns useful against torpedo-boats, but it is not desirable to encumber them with torpedo tubes, which they could not use with efficiency because their displacement would disqualify them for secret and insidious attack. As torpedo-boat destroyers, we believe the requisite qualifications could be obtained with a displacement of about 2,000 tons, which should be altogether employed to give them speed and resistance against the sea, and we believe that such a type would be preferable to the torpedo vessels of the English Navy such as the "Alarm," "Rattlesnake," "Jason," &c., which showed themselves useless against torpedo-boats by reason of their frequent defects, and want of speed, and which had to be reduced when there was the slightest sea on.

The larger class of cruisers, such as the 2nd class cruiser "Andromache," and the 1st class cruiser "Blenheim," rendered much better service in chasing torpedo-boats than those above mentioned; it also appears to us that the "Havock" type of 220 tons displacement, now under construction in England, cannot be considered as really torpedo-boat destroyers, for they do not appear to present any great differences, nor to have very much advantage over the new torpedo-boats, such as those of the French navy "Forban" and "Chevalier"; in fact the speed of all is more or less the same; and they would all be, more or less, influenced by a heavy sea; the light armaments of each type are about equal in power, and we do not see any reason why the torpedo-boats proper should have the worst of it in an engagement with the destroyers, which, it may be added, would frequently find themselves obliged to fight against a superior force in point of numbers. As regards the torpedo gunvessels, admitting that they are not of much use against torpedo-boats, their functions in war would appear to be singularly limited; they are too large for successful surprise attack with the torpedo, and with a heavy sea they could neither attack nor run away from ships of larger size; for an artillery fight they could not possibly be used, unless against ships identical in type and quality with themselves; for exploring services and for communication they are ill-adapted, being easily liable to injury and incapable of keeping up against a heavy sea; for what particular service, then, can they be employed?

It seems to us that the "avviso" type, which we described a little further back, could be employed as a torpedo-boat destroyer, especially

as a little sea would only render its action more certain; and it would also appear that it would be far easier to obtain such a type of ship from the mercantile marine for this purpose than to find suitable *so-called* auxiliary cruisers, which we wish to load up with arms and entrust with services that it is probable they would never be able to carry out satisfactorily. In order to obtain the useful assistance of the mercantile marine, it is sufficient to subsidize swift ships which are good sea boats, and provide them with the lightest guns, so that it would be an easy matter for them to send a torpedo-boat to the bottom. As to torpedo-ships, properly so called, it would probably be better to have them of special design, and qualifications for this particular service only. As regards cruisers we will not enter into a long discussion of existing types and of those already designed or projected; their dimensions must be determined by the requirements of the nation which constructs them, and more particularly by the conditions of the war services which the nation would require them to fulfil. Their armament, defensive power, and range of action are evidently dependent on their displacement, but it is essential that their speed should be superior to ships of the line, and their displacement sufficient to give them great range of action and power to fight their guns in bad weather. We may conclude, finally, with regard to these naval manœuvres, that it is not always possible to extract from them safe and precise information, as it often happens that, at such times, the ships are not called on to perform those special services for which they were designed and constructed. Thus there is very little to be learnt by employing *bonâ fide* cruisers for purposes of communication only; and certainly nothing at all is gained by employing torpedo-boats, and wearing out their crews, in making voyages and performing the duties of scouts and despatch boats.

NAVAL AND MILITARY NOTES.

NAVAL.

Home.—The new 2nd class cruisers "Æolus" and "Spartan" have been commissioned by Captains Groome and Winsloe respectively, and will reinforce the squadron in the Mediterranean; the 1st class torpedo-gunboat "Skipjack" has also been commissioned for the same purpose. The 1st class torpedo-gunboat "Gleaner," which was commissioned to relieve the "Sandfly," has arrived at Malta, and the "Sandfly," instead of returning home, is to be paid off and placed in the Fleet Reserve at Malta.

The 3rd class cruiser "Satellite" has been commissioned by Commander A. C. Allen to relieve the 3rd class cruiser "Garnet" in the Pacific, and has left England for that station.

The 3rd class battle-ship "Audacious" has been paid off into the A Division of the Medway Fleet Reserve, and her officers and crew transferred to the 2nd class battle-ship "Edinburgh," which will be the new guard-ship at Hull. The old gunboat "Firm," tender to the "Galatea" at Queensferry, has been paid off, being completely worn out, and her officers and men transferred to the new 1st class torpedo-gunboat "Niger"; this change is another important step in the direction of completely modernizing the vessels of all classes forming our 1st Reserve Squadron.

The 1st class cruiser "Theseus" has successfully completed her steam trials. The preliminary trial of the ship—which was a progressive one—was undergone on December 6, when a maximum of 10,300 I.H.P. was developed by the engines with a mean boiler pressure of 150 lbs. and an air pressure of 0·35 in. At the continuous seven hours' run under natural draught the following were the mean results:—With an air pressure of 0·43 in. an ample supply of steam was maintained at a boiler pressure of 149·4 lbs. per sq. in., and with vacuums of 27·2 in. and 27 in. the engines attained a speed of 96·18 and 96·3 revolutions per minute, and developed 5,315 and 5,293·4 I.H.P., in starboard and port engines respectively, or a total I.H.P. of 10,608, the resultant speed of ship being 18·6 knots, her draught at the time being 22 ft. 3 in. forward and 24 ft. 4 in. aft. The conditions of acceptance of the "Theseus" by the authorities in respect to her trials and the power to be developed by her propelling machinery differed materially from those imposed in the case of her sister ship, the "Grafton." In that of the "Theseus" the accepted satisfactory test was a preliminary trial of six hours' duration, and a full power trial in which 10,000 I.H.P. was to be developed and sustained by the engines for eight consecutive hours with natural draught only. The "Theseus" is 360 ft. long, with a beam of 60 ft., and at a mean draught of 23 ft. 9 in., has a displacement of 7,391 tons. Her propelling machinery consists of two independent three-cylinder triple-expansion engines, each driving a three-bladed gun-metal screw 16 ft. 9 in. in diameter. Steam is supplied by eight single-ended circular tubular boilers, designed for a working pressure of 155 lbs. per sq. in., capable of generating ample steam when under forced draught for the development of 12,000 I.H.P. The trials were very satisfactory, the engines having developed 688 H.P. over the contract, and the weather having been very stormy with a heavy sea running. The armament of the "Theseus" consists of 2 9·2-in. 22-ton B.L., 10 6-in. Q.F., 16 small Q.F. guns, 5 0·45 Nordenfelts, and 4 14-in. torpedo-tubes.

The new battle-ship "Centurion," which is fitting out to relieve the "Im-

périeuse" as flag-ship in China, and whose successful steam trials, when she attained a speed of 18·5 knots, we recorded in November Notes, has now completed her gunnery trials, and as the system of her heavy gun mountings and loading gear is novel and adopted for the first time in the Service, the trial created great interest among naval officers and gunnery experts. We have taken the following account of the trials from the "Times."

The "Centurion" is a 1st class battle-ship of a distinctly new type, of which there are only two examples in existence—herself and the "Barfleur." She is 360 ft. long and 70 ft. broad, with a displacement of 10,500, or 3,500 tons less than that of the ships of the "Royal Sovereign" class. A belt of steel armour, having a maximum thickness of 12 in., protects the water-line for about 250 ft. of her length, and extends below water to a depth of 5 ft. and above water to a height of 2½ ft. Associated with the belt is a protective deck from 2 in. to 2½ in. in thickness, which is completed at the extremities by athwart armoured bulkheads 8 in. in thickness. The armament consists of 4 10-in. 29-ton guns, mounted in redoubts; 10 4·7 Q.F. guns, of which 4 are carried in armoured casemates; 8 6-pr. and 9 3-pr. Hotchkiss Q.F. guns; a complement of field and machine guns; and 7 torpedo-tubes, 2 being submerged. The chief features of the ship are the disposal and mounting of the main armament, which is arranged to fire upon each broadside in pairs or independently, and, notwithstanding the weight, which amounts to 226 tons, including shields, guns, mountings, and turntables, can be worked by either hand or steam appliances, or by both in combination. The mountings have been designed and manufactured by Sir Joseph Whitworth and Co., and are specially constructed to secure high-angle fire. The heavy guns are mounted in a couple of redoubts, which cannot, strictly speaking, be described as being either turrets or barbettes, thus differing from any system hitherto adopted in the navy. They are, in fact, a blending of the two methods in vogue. That is to say, while the 10-in. walls of the redoubts are circular and vertical like a turret, they are fixed like a barbette. They differ from the barbette in the fact that they are built up in segments and not in flat slabs. The redoubts are topped with nickel-steel hoods or shields for the protection of the gun crews, and rotate with the training of the guns and turntables on which the guns are carried. The shields, which are pear-shaped in plan, slope upwards and backwards after the manner of a barbette, an arrangement which gives an effective resistance to horizontal fire of 11 in., although possessing an actual thickness of 6 in. The obliquity of the armour has also the additional advantage of causing the shot to glance off before penetration. Briefly, the arrangement may be described as a turret revolving within a fixed barbette.

The supply of ammunition is arranged in such a way that the guns can be loaded at any angle of training, without coming to a fixed loading station after each discharge. So far as elevation and loading are concerned, they can be manipulated by hand, and the training is effected by a couple of engines, although hand-gear is also supplied as an auxiliary. It is also intended to fit electro-motors to the elevating apparatus, designed for a large angle of fire, viz., "minus" 7, "plus" 35, of elevation. The loading station being almost horizontal, the electro-motors will be valuable adjuncts to the hand-elevating appliances when the guns have to be moved through the angle from loading position to "maximum" elevation, or thereabouts. The motors, however, are merely auxiliaries, as the elevation can be accomplished by the manual gear, though less expeditiously. The front of the shield is sloped at an angle which allows of the guns being moved through an exceptional range of 42° without requiring unduly large ports. The guns are mounted upon two gravity-return slides, which are provided with hydraulic brakes for checking recoils, and are secured to the turntable, which is carried by a live roller ring. The lower path is supported on a structure entirely independent of the redoubt, which is built above the upper deck to the base of the shield, and extends downwards to the armoured deck, and consequently completely encloses the turntables, roller paths, ammunition hoists, and the training mechanism. In the centre of the redoubt is a tube extending from the magazine deck to almost the underside of the turntable. It is divided vertically into two compartments, each of which is fitted with guides and cages. The larger compartment contains a cage

capable of bringing up ammunition for the guns, and the smaller one a cage which can carry a couple of projectiles or a single charge of powder. The former is worked by a steam hoist erected on the machinery deck, and controlled from the top of the central tube, while the latter is worked entirely by hand, and is intended as an auxiliary service, for use in case of accident to the steam gear or when steam is not available. The ammunition is lifted into the cages from the magazines and conducted to the top of the central tube, which terminates in a chamber secured below the turntable, and revolves with it around the tube. This chamber is fitted with two hoists, one behind each gun, and each capable of carrying a projectile and a couple of half charges, and delivering in rear of the breech in readiness for loading. The hoists are worked by windlasses by men inside the chamber. The "ready supply" of projectiles are stowed around the sides of the chamber, about 60 rounds being thus disposed of. On ordinary occasions the projectiles would be taken from their pockets and deposited in the upper hoists leading to the guns, while the powder would be conveyed by the steam cage to the top of the fixed central tube (around which the chamber revolves), and thence transferred by hand to the upper hoists ready for delivery. But should the supply of shot from the chamber be exhausted, a further supply can be procured from the magazines through the central tubes, either by the hand or steam cage, and transferred to the upper hoists. An electro-motor is being fitted to the upper hoist for rapid transport of the charges to the gun. The sighting arrangements are similar to those in many other of Her Majesty's ships, except that, owing to the large angle through which the guns move, special arrangements have had to be adopted to ensure the angular movement of the sight-bars through the extreme range. Each shield has two sighting hoods, from which either of the guns in the redoubt is trained and elevated, the latter operation being effected by means of an electric switch or by a hand wheel. The guns fire the usual 500-lb. projectiles with 252 lbs. of B prism powder. The normal length of recoil is 30 in., and the control is effected by a central tapered bar, similar to that used in H.M.S. "Devastation."

As carried out, the order of firing was as follows:—

After Barbette.

Gun.	Rounds.	Charge.	Elevation.	Bearing.	Recoil.
Left gun....	1	Reduced	2° elevation	16° abaft S. beam	Nil.
	2	Full	6 „	10° before P. beam	30 in.
	3	Full	15 „	10° abaft S. beam	30 in.
	4	Half	34½ „	Port beam	17¾ in.
	5	Half	34½ „	Starboard beam	21 in.
Right gun...	1	Reduced	2° „	16° abaft S. beam	30 in.
	2	Full	6 „	10° before P. beam	30 in.
	3	Full	15 „	10° abaft S. beam	30 in.
	4	Half	35 „	Port beam	18 in.
	5	Half	34½ „	Starboard beam	21½ in.

Fore Barbette.

Left gun....	1	Reduced	Horizontal	Port beam	30 in.
	2	Full	10° elevation	Port beam	30 in.
	3	Full	10 „	Port beam	30½ in.
	4	Half	35 „	Starboard beam	16 in.
	5	Half	35 „	Starboard beam	22 in.
Right gun...	1	Reduced	Horizontal	Port beam	30 in.
	2	Full	10° elevation	Port beam	30½ in.
	3	Full	10 „	Port beam	30½ in.
	4	Half	35 „	Starboard beam	16 in.
	5	Half	35 „	Starboard beam	17 in.

It will be observed that the rounds discharged from each of the four guns were in excess of the usual number, extra tests being deemed indispensable in the case of a system not hitherto put to the test. The third and fifth from the guns in each barbette were discharged simultaneously. Half charges were used, because the high angles of elevation at which they were fired made it advisable to reduce, as far as possible, the blow of the guns upon the slides and recoil gear. After each salvo, careful observations were carried out, for the purpose of ascertaining whether any deflection in the turntables had taken place during the double strain. Not the slightest deviation from the horizontal was noticed in any direction. The trials throughout were in every respect successful, and there were no hitches. The weak point of the ship is, of course, the 50 ft. of unprotected water-line before and abaft the belt, which may at any time lead to a repetition of the fiasco which occurred not long ago in Malta harbour, when a torpedo-boat rammed the "Nile," a 1st class battle-ship of 11,000 tons, and inflicted such damage on her weak unarmoured bow plating at the water-line that the huge ironclad had to be docked for repairs.

Tenders for 32 out of the 42 new torpedo-destroyers of the "Havock" class have been given out among different firms. Messrs. Yarrow and Thornycroft are each building five. Messrs. Laird four, and other firms, some of which are new to naval construction work, have a contract for two or three apiece.

The contracts for building the new 1st class cruisers "Powerful" and "Terrible" have been placed with the Naval Construction and Armament Company, at Barrow, and Messrs. J. and G. Thomson, of Glasgow, respectively. The cost of the hull of these ships is 338,000*l.* and 345,000*l.* respectively, in addition to 100,000*l.* for the machinery of each. The time for completion is three years. Orders have been given that the work of building the "Powerful" is to be begun at once, and by March 31st the sum of 57,544*l.* will have been spent on her construction. The "Terrible" will not be begun until the beginning of the next financial year.

The new 1st class gunboat "Leda" has been passed into the A Division of the Medway Fleet Reserve, and is now ready for commissioning.

General.—The war-ships, exclusive of torpedo-boats, launched during the year 1893 for the various navies, with their tonnage, I.H.P., and estimated speed, were as follows:—

Great Britain.—2nd class protected cruisers: "Astræa," "Cambrian," "Charybdis," "Flora," "Forte," and "Hermione," all of 4,360 tons, 9,000 I.H.P., and 19·5 knots. Gun-vessels: "Speedy," 810 tons, 4,500 I.H.P., 20·2 knots; "Dryad," 1,070 tons, 3,500 I.H.P., and 19·0 knots. Torpedo-boat destroyers: "Havock," "Hornet," "Daring," and "Lynx," each 220 tons, 3,500 I.H.P., and 26·2 knots.

France.—1st class battle-ships: "Charles Martel," 11,882 tons, 13,500 I.H.P., 17·5 knots; "Jauréguiberry," 11,818 tons, 13,275 I.H.P., 18 knots. 2nd class coast-defence battle-ships: "Tréhouart," 6,610 tons, 8,400 I.H.P., 17 knots. 1st class armoured cruiser: "Charner," 4,745 tons, 8,300 I.H.P., 19 knots. 2nd class protected cruisers: "Chasseloup-Laubat," "Bugeaud," and "Friant," all 3,720 tons, 9,000 I.H.P., and 19 knots; "Suchet," 3,430 tons, 9,000 I.H.P., 20 knots. Torpedo-cruiser: "Fleurus," 1,310 tons, 4,000 I.H.P., 18 knots. Torpedo-aviso: "D'Iberville," 935 tons, 5,000 I.H.P., 21·5 knots. Torpilleurs-de-haute-mer: "Chevalier," "Mousquetaire," and "Lansquenet," 123, 138, and 125 tons, 2,000, 2,600, and 2,100 I.H.P., and 27, 25, and 26 knots respectively; "Archer," 120 tons, 1,250 I.H.P., 20·5 knots; "Argonaute" and "Tourmente," 119 tons, 1,500 I.H.P., and 23 knots.

Russia.—1st class battle-ships: "Tri Sviatitelya," 12,500 tons, 10,600 I.H.P., 17·5 knots. 2nd class coast-defence battle-ships: "Admiral Senjavin" and "Admiral Ushakoff," both 4,126 tons, 4,250 I.H.P., and 16 knots. Torpedo-

cruisers: "Gaidamak," "Vsadnik," 500 tons, 3,600 I.H.P., 22 knots; "Griden," 400 tons, 3,500 I.H.P., 21·5 knots.

United States.—1st class battle-ships: "Indiana," "Massachusetts," and "Oregon," 10,200 tons, 9,000 I.H.P., 16·2 knots. 1st class protected cruiser: "Minneapolis," 7,350 tons, 21,000 I.H.P., 22 knots. Armoured ram cruiser: "Kathadin," 2,183 tons, 4,800 I.H.P., 17 knots.

Argentine Republic.—Torpedo-cruiser: "Patria," 1,183 tons, 1,250 I.H.P., 18 knots.

Austria-Hungary—1st class armoured cruiser: "Kaiserin und Königin Maria Theresia," 5,270 tons, 10,000 I.H.P., 19 knots. Training corvette: "Donau," 2,344 tons, 1,800 I.H.P., 12 knots.

Brazil.—5 torpedo-avisos (purchased from the Schichau firm of Elbing), 120 tons, 2,000 I.H.P., 26 knots.

Chili.—1st class protected cruiser: "Blanco-Encalada," 4,000 tons, 14,500 I.H.P., 23 knots.

China.—Protected cruiser: "Foo-Ching," 1,040 tons, 2,000 I.H.P., 16 knots.

Denmark.—Torpedo-avisos: "Nordkaperen," "Makrelen," 120 tons, 1,300 I.H.P., 20 knots.

Germany.—2nd class coast-defence battle-ship: "Hagen," 3,495 tons, 4,800 I.H.P., 16 knots. 2nd class protected cruiser: "Gefion," 4,000 tons, 9,000 I.H.P., 20 knots.

Italy.—2nd class ram cruiser: "Elba," 2,732 tons, 6,500 I.H.P., 18·5 knots; "Liguria," 2,280 tons, 6,500 I.H.P., 18·5 knots.

Hayti.—Gunboats: "Alexandra Petion," "Capois la Mort," 260 tons, 700 H.P., 14 knots.

The total war-ship tonnage launched by each of the more active naval Powers was thus—France, 52,188; United States, 40,050; Great Britain, 28,920; and Russia, 21,452.

Argentine Republic.—On the 28th December was launched from the works of Messrs. Laird Bros., at Birkenhead, a twin screw torpedo-cruiser, which is the 15th vessel built by this firm for the Argentine Navy. She was christened the "Patria," and may be described as an enlarged and improved vessel of the "Halcyon" type in the British Navy. An important departure from the vessels of her type in the British Navy is the substitution of a complete spar-deck for the poop and forecastle. She has a length of 250 ft., with 30 ft. beam, and a displacement of 1,183 tons. The machinery consists of two sets of triple-expansion engines of 1,250 I.H.P., each driving two three-bladed propellers with steel bosses and manganese-bronze blades; distillers, evaporators of large capacity, and complete electric installation are provided. The boilers are of steel, four in number, of the locomotive type, working at a pressure of 155 lbs. per square inch, to be worked under the closed stokehold system. Her armament will consist of two 4·7 Q.F., four 8-pr. Q.F., two 3-pr. Q.F. guns, one bow and one mid-ships revolving torpedo-tubes.

Austria-Hungary.—The armoured casemate battle-ship "Tegetthoff," which was launched originally in 1878, has been undergoing important alterations and repairs, which greatly add to her value as a fighting ship, and increase her speed by 2 knots. She is a central battery ship, with a 14-in. water-line belt, which is carried completely round the ship, except at the bow, and armour of the same thickness also protects the battery, which is made to overhang from the main deck, much after the fashion of the upper-deck batteries of the English "Audacious" class; the bulkheads which shut in the battery fore and aft are of 12-in. armour, and of an oval form, and are carried down to the armoured deck, which is 3 in. thick. The ship originally carried six short 28-cm. guns in her main battery; for these have been substituted six of the new 35 calibres long, 24-cm. (9·2-in.) guns; the two foremost guns and the two after ones fire right ahead and right astern respectively, having a training angle of 120°, and have been fitted with electric training gear. With regard to the secondary armament, five 6-in. Q.F. guns have replaced six bronze 9-cm. guns; four of these are in sponsons on the upper deck, two forward and two aft, and the fifth

is mounted under the forecastle as a bow-chaser. Of small Q.F. guns, she now carries nine 44 calibres long, and six 33 calibres long 3-prs., two 8-mm. mitrailleuse (system Skoda-Dormus), and two 7-cm. Uchatius guns for boat and field-gun service. Two military masts with double fighting tops have taken the place of the old three masts, when she was barque-rigged, and the number of search-lights has been increased from two to five, while below is a complete installation of the electric light. But the most important change is in her machinery; formerly she was a single-screw ship, with old-fashioned engines developing 5,000 I.H.P., but she has now been fitted with twin screws and modern engines developing 8,800 I.H.P., and to give a speed of 16·2 knots instead of 14 knots, her former speed. The new machinery has been constructed by the Schichau firm at Elbing. ("Nautische Rundschau," Wien.)

France.—Rear-Admiral Menard has been appointed to the command of the 2nd Division of the Northern Squadron in place of Rear-Admiral Barrera, who has completed his period of service; Captain Fauque de Jonquières joins the "Victorieuse" as flag-captain to Admiral Menard. Rear-Admiral Turquet de Beauregard has been nominated President of the Permanent Commission of Control, and Rear-Admiral Dieulouard Inspector-General. Vice-Admiral Rieunier has taken up the duties of President of the Committee of Inspectors-General of the Navy. ("Petit Var.")

The following will be the composition of the Squadron of the North as provided for the present year. The flag of the Vice-Admiral commanding will continue to fly on board the "Suffren," an old battle-ship, which dates from 1870; the Rear-Admiral will continue to fly his on board the "Victorieuse," an armoured cruiser of an antiquated type; the coast-defence battle-ships "Requin," "Fulminant," "Furieux," and "Tonnerre" will be the other armour-clads of the fleet. The squadron is, however, to be strengthened in cruisers, as, according to present arrangements, the new armoured cruiser "Latouche-Tréville," the 1st class cruisers "Alger" and "Isly," the torpedo-cruisers "Fleurus" and "Épervier," and the 2nd class cruiser "Suchet" and 3rd class cruiser "Coëtlogon" are to join the squadron. The "Latouche-Tréville" and "Fleurus," being new ships, have first to complete their trials. The new coast-defence battle-ship "Jemmapes" will also join the squadron, taking the place of the "Requin," if she can be completed and undergo her trials in time. ("Petit Var.")

The effective fighting personnel of the crews of the fleet for 1894 will be 31,686 men, of whom 26,583 will be embarked. The pay will amount to a little over 14 million francs, or a mean of 450 francs per unit. The personnel of the engineers and stokers will be 7,104, costing 7,838,000 francs, or 1,100 francs per man. The armourers, artificers, bandsmen, and other non-combatants amount to 2,400, at a cost of 1,764,000 francs. The whole force will amount to 41,200 men, whose wages will reach 24 millions. ("Petit Var.")

The new torpilleur-de-haute-mer "Archer" is to be commissioned, and she will take the place of the "Grenadier" in the Northern Squadron; when relieved, the "Grenadier" will proceed to Cherbourg, where she will be placed in the Reserve, and will form a group, with the "Grondeur" and "Zouave." In the December Notes we stated that the Reserve groups of the torpilleurs-de-haute-mer were to be composed of two units: we should have said three. ("Yacht.")

A deplorable explosion occurred last month on board the new torpilleur-de-haute-mer "Sarrazin" while undergoing the trials for the acceptance of her machinery off Rochefort, which has resulted in the death of M. Mangini, the engineer in charge, M. Gaillard, one of the officials of the firm of M. Cail, the contractors, M. Robert, the foreman of naval construction, and two workmen, who all succumbed to their injuries; while another officer, M. Durand, and three other men were seriously injured. The "Sarrazin" had on board the Experiments Committee,

composed of Capitaine-de-Vaisseau L. Juhel, Capitaine-de-Frégate E. Templier, Lieutenants Beausant and Noël, and other officials. The "Sarrazin," a vessel of 104 tons displacement and 1,000 H.P., was running the mile at full speed when the indicator in the conning tower on deck showed that the pressure had fallen suddenly. MM. Mangini and Gaillard, the two engineers, went below at once to ascertain the cause, but had scarcely reached there when an explosion took place and the stokehold was filled with steam and flames. In spite of frightful injuries, all who were in the stokehold succeeded in reaching the deck. M. Mangini, although he knew he was mortally injured, reached the Commander's cabin and succeeded in temporarily binding his wounds up, while the others were being attended to on deck. One of the stokers, thanks to his presence of mind, was only slightly hurt; he was in the coal-bunker at the moment of the explosion, and instantly closed the door, thus fortunately shutting out the steam and flames. It was some time before help could be obtained, but the gunboat in attendance at last came alongside and the wounded were conveyed to the Naval Hospital. Great regret is felt in naval circles at the death of M. Mangini, who was only 29 years of age, and was looked upon as a young officer of much promise. An examination of the "Sarrazin's" boiler has shown that the explosion was due to the longitudinal rupture of a tube. The boiler was one of the Babillot system, and is to be replaced by the makers, M. Cail. It was a tubulous boiler, designed with a view of obtaining a very large heating surface in proportion to its dimensions. Each element was composed of a tube, 16 cm. in diameter, enclosing another concentric tube, the water circulating in the space between them, the flame and heated gases passing at the same time outside the outer and through the inner tubes. When tried on shore it had given very satisfactory results. The "Sarrazin" has been returned to her contractors. ("Le Moniteur de la Flotte.")

The Active Division of the Mediterranean Squadron, under the command of Vice-Admiral Boissondy, and comprising the battle-ships "Formidable," "Dévastation," "Hoche," "Neptune," and "Magenta," and the cruisers and avisos "Alger," "Wattignies," "Bombe," "Vautour," and "Levrier," left Toulon on the 17th January for the winter cruise, and are not to return until Easter; the battle-ships "Amiral Baudin" and "Marceau" will rejoin the squadron when their repairs are completed. ("Yacht.")

The small arm armament of the fleet is to be changed. The Compagnies de Débarquement and the Fusilier-Marins have hitherto been armed with the Kropatschek repeating rifle, but they are now to be armed with the Lebel. ("Le Moniteur de la Flotte.")

Various machines for the artificial cooling of powder-magazines in ships are in course of construction at Mourillon. It is interesting to note that these machines are to be employed for reducing the temperature of the magazines; those for the "Redoutable" have already been delivered: one for the 27-cm. magazine of the "Hoche" is on trial, and a second being constructed. It is to be noted that in most modern war-ships a very high temperature is produced in the vicinity of the magazines, which acts injuriously on the powder; for instance, on the "Vauban" in the Mediterranean, 75° were registered; whilst the new smokeless powder (Vieille type) deteriorates at 64°. It is to be considered whether this precautionary measure will not also have to be taken by other naval Powers, which possess ships similar in construction and powder just as liable to deterioration. ("Marine de France.")

Since the acquisition of Tunis by France 12 years ago the Government have spared no pains in developing its unique strategical and mercantile advantages. In addition to the important works which when finished will make Biserta one of the finest harbours in the world, and the lesser works now being carried out at Sfax and Susa, the old port and town of Tunis, formerly inaccessible except to coasting vessels of the lightest draught, have, by the great improvements lately

completed, been brought into direct communication with the sea, and vessels of considerable draught can now proceed to and lie off the city.

Tunis, before the French occupation, had long fondly dreamed of being a seaport, and the Bone-Guelma Company was the first to bring the question within the radius of a practical objective by obtaining in 1880 from the Bey a concession of the port, which shortly afterwards was passed over to the Society of Construction of Batignolles.

M. Cambon, the first Resident-General, in order that the hands of the Government should not be tied, entered into negotiations with the company, and an agreement was reached in 1885. The concession was then converted into a public works contract, and the port remained the property of the State.

The plans were finally approved in July, 1888. The Batignolles Society were given six years for the execution of the work, but so energetically were operations pushed that the work was finished last summer, seventeen months before the time specified.

Tunis is separated from the sea by Lake Bahira (see plan) about 6 miles in width, which in turn is separated from the gulf by a lido so long and narrow that the ancients gave it the name of Tænia (tape-worm). A canal of a very picturesque aspect, with the fortifications that defended its mouth and the multitude of craft anchored in it, traversed this strip of land. It was, therefore, necessary to pierce the lido and to form in the lake, whose depth is only 3 ft., a channel to permit ships drawing over 20 ft. to reach the port of Tunis.

An outer port was formed by a channel dredged in the sea to a depth of 30 ft. This has a width of 325 ft. at the bottom and is protected on the north by a large jetty of stone and on the south by a jetty of rockwork. In the lake the channel forms a straight line of about 5 miles, and its width is the same as that of the Suez Canal. It is connected with the sea channel by a curved section formed in the lido, which has a length of 4,750 ft., and its bottom, starting from the normal width of 72 ft. in the lake, widens progressively to the width of the sea channel. In order to prevent delay there is in the middle of the channel a gare 1,640 ft. long, where vessels will pass each other. At Tunis the basin has an area of 24 acres, which is also dredged to a depth of 30 ft. It is bordered on three sides with the wide terrepleins formed in the lake by means of the soil dredged from the latter. The lake channel is protected against the entrance of sand and mud by embankments of rockwork in the vicinity of Goulette; while in the crossing of the lake the channel is protected by two walls of piles; each of these walls is more than 9,000 yds. in length. The volume of the bottom dredged out approaches 175,000,000 cub. ft., a good third of which was carried out 12 miles into the open sea. The two other thirds were used for filling in around the basin and for the walls of the channel. These latter are already growing green under a spontaneous vegetation, and will before long become shady boulevards connecting Goulette with Tunis.

170,000 tons of stone were taken from the Corbon quarries for use in the masonry and rockwork, and in addition 40,000 tons of sand and 10,000 tons of lime were used in the work. The lido embankments and the southern jetty were finished in August, 1890, the lake walls in March, 1890, the northern jetty in August, 1891, and the dredging of the channel and of the port of Tunis in 1893.

The 12 years of the Protectorate have also transformed the city; the town has been drained, the sewers covered in, the streets cleansed, and they are now lighted with gas, while a handsome circular boulevard surrounds the town, on which trams run. Moreover a new European city is rapidly springing up, which already consists of a dozen or more streets of fine houses, planted with trees, in which some 10,000 Europeans, more than half of whom are French, reside. Great boulevards prolong these streets into the country. The French are said to be bad colonizers, but it is quite certain they are unsurpassed in the art of rapidly beautifying and rendering habitable the most squalid of Eastern towns. ("L'Illustration.")

Italy.—Vice-Admiral Racchia, ex-Minister of Marine, has been appointed to the command of the Permanent Squadron, in succession to Vice-Admiral the Duke of Genoa, who has been promoted to the rank of Admiral.

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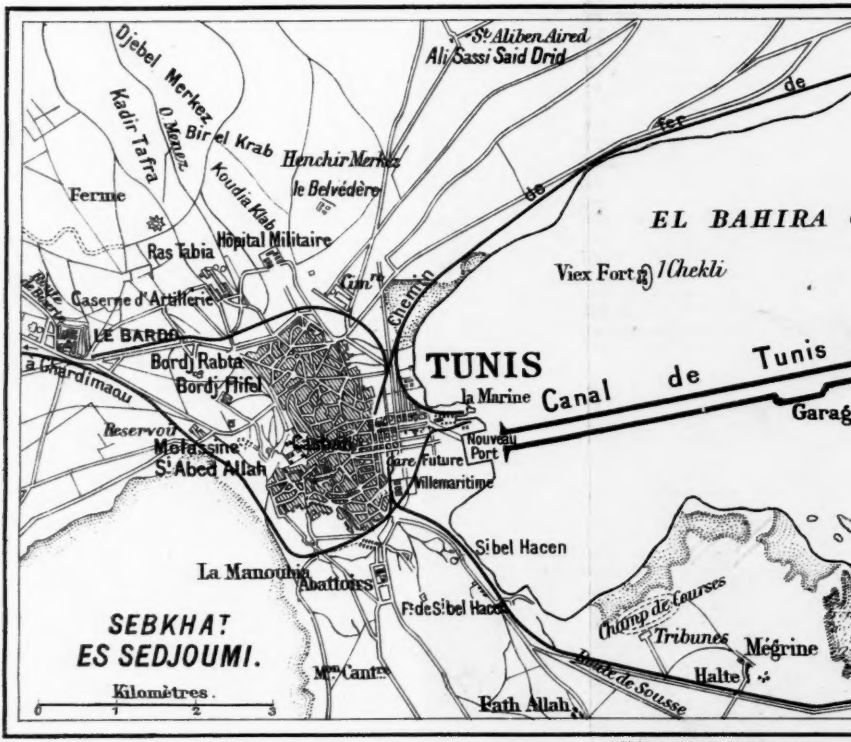
GENERAL VIEW OF TUNIS, GOULETTE, A

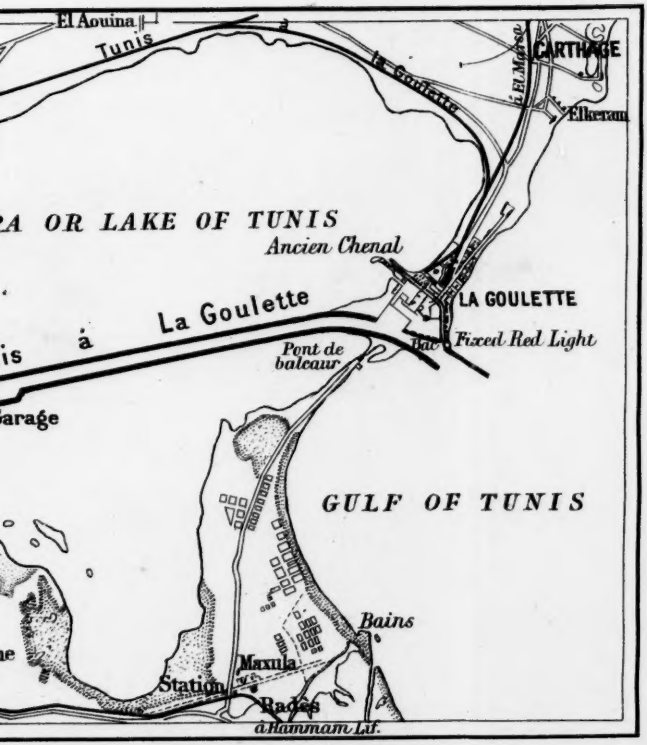
From "L'Illustration."



HARRISON & SONS, LITH., ST MARTINS LANE, W.C.

E, AND THE NEW CHANNEL.

on."



The two new armoured cruisers, of which one is being built by the firm of Orlando Brothers, at Leghorn, and the second by the firm of Ansaldo and Co., at Sampierdarena, have been named respectively the "Varese" and "Giuseppe Garibaldi"; the depôt-ship "Garibaldi," which is stationed at Massaua, has, at the same time, been re-named the "Saati." ("Rivista Nautica.")

In accordance with a Royal Decree, the ships of the Italian fleet have been distributed from the 1st October of last year between the three Departments (Sea-Prefectures) of Spezzia, Naples, and Venice, and also Tarento, as follows:—

1st Department (from the French frontier to Terracina, including Sardinia, Gorgona, Gianentri, and the islands lying between them; headquarters, Spezzia).—Battle-ships: "Italia," "Lepanto," "Re Umberto," "Sicilia," "Sardegna," "Duilio," "Dandolo," "Ruggiero di Lauria," "Francesco Morosini," "Andrea Doria," "Castelfidardo," "Maria Pia," "San Martino," "Terribile," "Formidabile"; the two latter are employed as torpedo and gunnery school-ships. Cruisers: "Savoia," "Giovanni Bausan," "Vesuvio," "Piemonte." Aviso: "Messagero," and certain gunboats, depôt, and other ships.

2nd Department (from Terracina to Cape San Maria di Leuca, including Sicily and the adjacent islands; headquarters, Naples).—Torpedo-cruisers: "Goito," "Partenope," "Minerva," "Aretusa," "Tripoli," "Urania," "Euridice," "Iride," "Calatafimi," "Caprera." Avisos: "Agostino Barbarigo," "Marc Antonio Colonna," and five gunboats, transports, &c.

3rd Department (from Cape San Maria di Leuca to the Austro-Hungarian frontier; headquarters, Venice).—Corvettes: "Flavio-Gioà," "Amerigo Vespucci," "Christoforo Colombo." Cruisers: "Etna," "Stromboli," "Fieramosca," "Dogali," "Lombardia," "Elba," "Marco-Polo." Avisos: "Rapido," "Staffetta," "Archimede," "Galileo," five gunboats, and four other vessels, transports, &c.

At Tarento.—3rd class battle-ships: "Ancona," "Affondatore." Cruisers: "Liguria," "Etruria," "Umbria." Torpedo-cruisers: "Monzambano," "Montebello," "Confienza." Aviso: "Vedetta," and five transports, &c.

Ships are to be dismantled and placed in reserve in their own Departments, where the necessary repairs are also to be carried out, although repairs, docking, &c., may be carried out in other Departments when it is more convenient.

By Royal Decree of 1878, the headquarters of the 2nd Sea-Prefecture is to be shifted from Naples to Tarento, as soon as the arsenal there is completed. ("Giornale Militare per la Marina.")

Netherlands.—The Naval Budget for the year 1894 shows a grand total of 15,619,355 64 gulden, of which 409,013 34 gulden are for the expenses of administration, &c., 6,309,270 gulden for materials and ship-building in Government dockyards, 5,320,565 gulden for the personnel, 1,945,690 gulden for pilot, coast and hydrographical service, 1,574,817 gulden for pensions, half-pay, &c., and 60,000 gulden for unforeseen expenses.

Heading II ("Provision for Material"), which contains the amount demanded for the repairs of ships, new constructions, &c., falls short in the sum total by 109,240 gulden as compared with last year, but this is due to the fact that in last year's Budget the building votes were saddled with a sum of 1,358,000 gulden for the "Konigin Wilhelmina der Nederlander" and the "Reinier Claezen."

For 1894, a sum of 3,389,610 gulden is provided for construction, materials, and fitting-out of new ships—guns and torpedo-fittings inclusive—which is 108,630 gulden less than last year; on the other hand, for the repairs, &c., of ships already built, 1,222,900 gulden, or an increase of 34,550 gulden, is shown.

The sums demanded for ship construction this year will be devoted to the pushing on of the three small ironclads which were laid down towards the end of last year, and have been named the "Evertsen," "Piet Hein," and "Kortenaer" respectively; they will be 280 ft. long, and with a beam of 45 ft. 6 in. will have a displacement of 3,400 tons, and an estimated speed of 16 knots. Protection will be afforded by an all round water-line belt of 6-in. steel armour, with a 2½-in. steel armoured deck, in addition to which will be a belt of coffer-dams filled with cellu-

lose. The armament will consist of three 8-in. guns, mounted in two barbettes protected by 9½-in. armour, two guns will be mounted in the fore barbette and one in the after, two 6-in. Q.F. guns in sponsons on the beam, 14 small Q.F. guns, and three torpedo-tubes, one in the bow and the other two one on each broadside.

The "Evertsen" is being built in the Government yard Schelde at Vlissingen, the "Piet Hein" in the "Netherlands Steamship" Company's yard at Fijenoord (Rotterdam), where, also, the engines and boilers for the "Kortenaer" are being constructed, the last named ship herself being built in the Government yard at Amsterdam. ("Mittheilungen aus dem Gebiete des See-Wesens," from "Staatebegrootung voor het dienstjahr 1894.")

MILITARY.

Surgeon-Captain Beevor's recommendation for the substitution of shoes and spats for boots and leggings recalls the fact that, from the period of the formation of a standing army in England to about the year 1820, shoes and cloth or linen gaiters were worn by the infantry of the British Army and the Militia, and during all this period, that is to say, until the institution of railways, changes of quarters were of necessity performed by march route. In 1708 the private soldier received one pair of shoes and one pair of stockings annually; in 1717 the Guards received annually a pair of stockings and shoes each, value 4*s.* and 6*d.* each; and in 1737, at a review before the King, in London, the men of the Guards were ordered to wear "square-toed shoes." In 1797 the Line and Militia were provided annually, by stoppages from their pay, with two pairs of shoes each, valued at 6*s.* per pair, and 4*s.* stopped for mending, with two pairs of long black cloth gaiters, valued at 4*s.* per pair, and one pair of stockings or two pairs of socks, valued at 1*s.* 6*d.* It is interesting to note the difference in the value of the stockings supplied to the Guards in 1717, and those issued to the Line and Militia in 1797. In 1804 the annual necessaries included one pair of shoes, valued at 7*s.* per pair, and three pairs of worsted or yarn socks, paid for by the men; but in 1805 the issue was two pairs of shoes, valued at 6*s.* per pair, and one pair of stockings or two pairs of socks. About the year 1820–25, laced half-boots and dark-grey trousers were issued, in lieu of white breeches, gaiters, and shoes.

Austria-Hungary.—A Vienna letter, in the Prussian "Kreuz," states that from the 1st April, 1894, 41 infantry regiments and eight infantry field battalions will be raised to the augmented peace establishment. This augmentation of establishment implies a far greater accession of strength to the whole army than the mere statement of the fact conveys. The weak peace effectives of the battalions has long been the weak point of the Austrian Service, crippling all efforts to impart a true military training, and leading to the destruction of all community of sentiment and mutual reliance on mobilization when the numbers of reserve men swamped the existing cadres. For years this step has been called for in the military press, and all well-wishers of the Dual Monarchy will rejoice at its ultimate, though partial, attainment. From the same paper, we learn that the hitherto existing instructions for the use of the infantry spade equipment, the deficiencies of which have long been felt, has been superseded by a new and more extensive regulation, entitled "Technical Instruction for the K.K. Infantry and Rifle Battalions," the object of which is to render the infantry independent of the assistance of the pioneer companies. A new and improved pattern of the Linemann shovel has also been issued, in the proportion of 99 to each company. A new cadet school—the thirteenth—will open on 1st September of this year, at Marburg, in South Steiermark.

Germany.—The North Sea Canal from Kiel to Wilhelmshafen is completed, and the section from Kiel to Rendsburg open to traffic. The total cost incurred

has been eight million sterling, and it is computed that a rate of 95 centimes, say, 9*d.* a ton, will suffice to pay 4 per cent. on the capital. Considering the dangers to which vessels navigating the Sound and Belt are exposed—300 are lost annually—this rate does not appear excessive.

The depth throughout is 39 ft., and width at bottom 72 ft. In consequence of the tides in the North Sea, and variations in level of the water in the Baltic, due to wind pressure, and amounting to, plus or minus, 8 ft. above or below the normal mean at Kiel, locks have had to be erected at either end.

On the strategical value of the canal it is hardly necessary to speak; it runs throughout in German territory, an important point in view of a possible Danish alliance with Russia and France. Its commercial value will probably greatly exceed current expectations, as it will afford safe access to the important harbours and trading centres along the Baltic coast. ("Avenir Militaire.")

The sensational story telegraphed from Berlin, of the young officer of the 2nd Guard Uhlans, fallen out by the Emperor on his inspection of the regiment on a bitter cold day in January, and ordered to ride forthwith to Dresden, with a letter to the King of Saxony, and of his arrival, fainting with cold and exhaustion, is thus explained by the German papers.

An order exists in the German cavalry that every subaltern is expected to execute, once in every three years, a ride of about 24 hours' duration, time and objective being left to the choice of the officer. The King of Saxony is "Chef" of the 2nd Guard Uhlans, and the idea occurred to the regiment to send its new year greeting by the hands of an officer, covering the distance on horseback. The King signified his pleasure at the suggestion, and, as a consequence, Lieut. von Wedel rode off, bearing the missive, and duly delivered it into the royal hands. The Emperor had nothing whatever to do with the affair. The distance, as the crow flies, is about 100 miles, but the weather and roads proved unfavourable, and the strain was more than the officer anticipated.

It is interesting to note the importance officially attached to these long-distance rides. ("Rev. de Cavalerie.")

Long-Distance Ride by Lieut. Freiherr von Gemmingen, 2nd Baden Dragoons. No. 21.—On the 20th and 21st January of this year, in service marching order, on an English half-bred mare; total distance, 270 km. (168 miles), in 43½ hours, of which 35¼ on the road, 8¼ resting. The weather was unfavourable, rain and wind, and the road from Bruchsal by Landau, Pirmasens, Zweibrücken, Bitsch, Niederbronn, Woerth, Weiszenburg, Germersheim, and back to Bruchsal again, a fair average of hill and plain. He rode alone, attending to his horse himself, and had the satisfaction of bringing her in fresh and in good condition.

Aluminium Water Flasks and Drinking Cups.—The February number of the "Jahrbücher" contains an interesting note on the new aluminium water flasks, &c., recently adopted in the German Army. The flasks are cased in felt and the net reduction in weight on the old pattern is 66 per cent. Experiments conducted to ascertain whether any deleterious reaction took place between the aluminium and the fluids usually carried in the flasks, viz., wine, spirits, tea, lemonade, &c., show that no cause for alarm exists. All ordinary cooking processes may be undertaken with aluminium utensils without danger, they only require ordinary cleanliness. The price of aluminium is now so low, about 2*s.* a pound, that its use might well be extended to field cooking utensils of all orders; 66 per cent. of a mule's back in officers' mess equipment is a reduction not to be despised.

The "Revue du Cercle Militaire" announces that an aluminium cooking utensil for infantry has actually been adopted in Germany.

France.—The War Ministry has issued the following programme for this year's autumn manœuvres:—Corps manœuvres, the 4th and 11th Corps combined opera-

tions for 20 days under General de Galliffet. The 1st and 3rd Cavalry Divisions will be attached to the above. Division Manœuvres: Divisional manœuvres will take place in the 1st, 6th, 7th, 8th, 10th, 12th, 13th, 16th, 17th, and 18th regions.

French Experiments with Aluminium Horseshoes.—M. Risler has addressed a report to the Société Nationale d'Agriculture de France on experiments made at the works of M. Japy, of Beaucourt, on aluminium horseshoes. The shoe, with 10 per cent. of some harder metal as alloy, is only one-fourth the weight of an iron or steel one, and is so malleable that it expands with the growth of the hoof. Great care is required in applying the shoe hot, as the metal becomes brittle if heated or cooled too rapidly. For racing or for use in veterinary cases, applied by skilled hands, the shoe may be useful, but it possesses too little endurance for cavalry purposes, and all experiments with alloys have hitherto failed to secure adequate wearing strength.

The "Revue de Cavalerie," for January, contains an interesting article, especially so to members of the Royal United Service Institution. It will be within the recollection of some of our readers that in 1893 there was established in France a society, under the title of "La Sabretasche," which in its aims and objects was identical with one of the objects for which our Institution in Whitehall was founded. Securing for its President the great military artist, Meissonier, and the goodwill of the Secretary for War, M. de Freycinet, it gave promise of great success, and actually started a journal of its own. The death of the great painter, and also of the War Secretary, gave a temporary blow to its further progress, though the Journal, we believe, still exists. General Loizillon is, however, much interested in the objects for which "La Sabretasche" was founded, and under its new President, M. de Detaille, the well-known military painter, a special effort has been made to resuscitate it. Officers similarly interested in England will be glad to learn that the outcome is that a new military museum is to be formed in France which will extend to all branches of the Service, and develop the work which has hitherto been conducted with success for the artillery branch of the French Service. Alongside Le Musée d'Artillerie, and under one direction, this French military museum promises, if its intentions are carried out, to outdo the Royal United Service Institution in completeness and comprehension. Advantage will be taken of the fine collection left by Meissonier to his society to form a gallery to illustrate, by portraits and otherwise, the military history of France. Collections of armour, colours, uniforms, &c., will be exhibited, as well as relics not only of distinguished officers but of those of humbler rank who have made names for themselves in the French military *rôle* of honour. We shall watch with particular interest the development of this project, which is one of particular historical value and interest, not only to all Frenchmen, but also to English officers interested in the progress and development of military history, arms, armour, and science.

Important railways were taken into use in November last, by which direct communication between the districts of the VIII (Bourges) and XII (Limoges) Corps and the eastern frontier is brought within measurable distance of completion, viz., the sections from Bourges to Cosne, crossing the Loire, at Sancerre, Bourges to Saint Florent, saving a long détour by Vierzon, giving a complete double line from Perigueux to Lorey, a point halfway between Toul and Commercy. Another important communication is completed by the termination of the works between Gien and Argent, but this is only a single line. ("Militär-Wochenblatt.")

Italy.—According to existing arrangements, 170,000 stand of the new rifles will be delivered by the 1st July, 1894.

The Defences of Spezia.—An account of the visit of the King of Italy and the German Emperor, on 1st May, 1893, and translation of an article in "l'Italia Marinara." The latter being of special interest, it may be as well to give a few

extracts:—The Humbert I. tower is a cyclopean structure which gives one some idea of the efforts made by Italy in recent years to protect her territory, and of the immense works executed for the defence of her principal military port It is an arsenal—it is a town excavated in the granitic rock of the island (Palmaria) with the sole object of obtaining emplacements for two 120-ton guns of 4-centimètre calibre (15¾ ins.), 14 mètres (say 46 feet) long, and carrying projectiles of 980 kilogrammes (19½ cwt.). In this subterranean town, besides the two powerful hydraulic pumps and the machines for working the monster guns, loading them, &c., there are distilling apparatus, electric light installations, and barracks. Besides being protected by the rock itself, the work is defended above by a cupola of hardened cast-iron more than a mètre thick. The guns were built by Krupp, the armour-plating is by Gruson, and the carriages and hydro-pneumatic mountings are by Armstrong. The group of batteries on the east coast of the Gulf of Spezia is composed thus:— Santa Teresa Bassa, close to the water, with three short 24-centimètre 9½-in. guns; Santa Teresa Alta, immediately above the first, on a position projecting out into the sea, at a height of 50 mètres (164 ft.), and armed with 8 guns of 32 centimètres (12½ ins.); *Falconara* battery, to the left of the last, at a height of about 140 mètres (459 ft.), armed with 12 long 9½-in. guns; Fort Piannelloni, on still higher ground, behind the last, armed with eight 28-centimètre mortars. All these guns have been constructed in Italy—mostly at Turin—and are of cast-iron subjected to a process which gives great hardness, and braced by steel rings. On a hill to the rear are the Braccialini's telegoniometers, which are practically like our Watkin's depression position-finder. The Marralunga battery is also described. ("R.E. Journal.")

Russia.—Interesting cavalry manœuvres are to take place in the spring in presence of the Emperor. It is proposed to unite 150,000 horsemen; no details of the plan have as yet been made public, but it is rumoured that the force will be frequently employed "on foot." It is a further working out of General Gourko's scheme, who, last summer, united 35,000 horse under his command, his object being to prove that cavalry and horse artillery can carry out an independent mission, even fight a battle, without the assistance of infantry. ("Spectateur Militaire.")

It is expected that the re-armament of the whole of the infantry of the field army with the improved Lebel repeater will be completed in a few months from date. ("Spectateur Militaire.")

In the last manœuvres experiments were made with the Norwegian cooking stove, the object being to provide the troops on the march, within the least possible space of time, with warm food. The apparatus used was the ordinary camp kettle fitting into a thick felt covering. The soup or stew being placed in the kettle is raised to boiling point, and then removed from the fire, the lid clamped down, the kettle inserted in its felt sheath, and the whole slung in the usual manner below the wagons. The process of stewing continues automatically, thanks to the heat retained, and even after several hours' march the temperature does not fall below 100° Fahr.

A Swim across the Vistula performed by a Brigade of Cossacks near Novo-Alexandria.—The river at the time was considerably swollen on account of the heavy rainfall in the Carpathians. The velocity of the current was 6 ft. a second. The breadth of the stream at the place selected for crossing was measured at 300 sagenes (= 700 yards). The crossing was performed by one regiment in two and a half hours, which included the delay caused by the limited number of boats available, the latter accompanying the troops for safety. The time taken by each sotnia in crossing was about 15 minutes. The crossing was performed still more successfully by the second regiment on the following day, the whole time taken being 1 hour and 10 minutes, and each sotnia taking eight to nine minutes. Clothing and accoutrements were carried in sail-cloth boats, which can be put together in 10 to 15 minutes. Each boat will carry the whole equipment of a section.

General Gourko's Successor.—As no change for the better can be reported or

expected in the health of General Gourko, rumour is busy in appointing his successor. According to the "Revue du Cercle Militaire," General Pavloff, originally of the Engineers, but who has served most of his time in the General Staff, is considered the most likely man for the appointment.

Field Howitzers.—Two new regiments, Nos. 4 and 5, of these weapons have been recently added to the three already existing; for the moment these new regiments have only two batteries each, against the four in the existing ones. Each battery has six pieces. ("Revue du Cercle Militaire.")

Winter Manœuvres.—According to the "Moscow Viedomosti," the troops in the Moscow district are to be exercised in winter manœuvres, which will, however, be suspended if the temperature falls below −8° Reaumur. Special attention will be directed to the construction of snow entrenchments, felt bivouac shelters, and the evolutions of artillery and cavalry over snow-covered ground.

Regulation of Fire in the Field Batteries.—Instructions on this subject have recently been issued. In ranging at distances over 3,000 mètres, three shots a minute are not to be exceeded; between 3,000 and 1,500, four to five may be delivered. Once the range is obtained, a battery of eight guns must not exceed 12 rounds a minute; one of six guns, six to nine, but this rate must not be maintained for more than five minutes. Generally rapid fire is only to be used at short ranges.

The Russian field mortar of 15·2-cm. calibre is (the article says) well worthy of consideration. The following experiments which have been made give a comparison between the effects of a field mortar and a heavy field gun. Shooting was carried on at figure targets representing sitting infantry, distributed over a field work 80 m. long and 25 m. deep. The direction of the shooting was at right angles to the left face of the work. The percentage of hits obtained by the field mortar at a range of 2,150 m., after one hour's firing, was 27; that of the heavy field gun, at a range of 2,300 m., for the same time, was 11¼. With the direction of fire at right angles to the front of the work, the field mortar at 1,500 m. obtained 27 per cent. of hits, the heavy field gun at 1,800 m. only 1½ per cent.

Sweden.—According to the Prussian organ, the "Kreuz Zeitung," Sweden proposes a redistribution of existing garrisons and of the additional forces her new Army Bill gives her. Danger is to be looked for in two quarters—in the south from Denmark as an ally of Russia, and specially in the province of Schoonen—and the bulk of her troops will be posted to deal with that eventuality. An overland invasion from the north is to be expected simultaneously, and to meet it fortifications are proposed at Boden. Efforts are also being made to strengthen the navy.

Switzerland.—A new small-bore carbine, Mannlicher pattern, has been approved for issue.

FOREIGN PERIODICALS.

MILITARY.

The United Service, U.S.A.—February. "American Men for the American Navy." "Origin and Development of Steam Navigation" (*concluded*). "A Cavalry Surgeon's Experience in the Battle of the Wilderness."

Journal of the U.S. Artillery.—"The International Electrical Congress of 1893

and its Artillery Lessons." "Siege Artillery." "Vertical Fire, by G. L. Zalinski." "Formulæ for Velocity and Pressure in the Bore of a Gun." J. M. Ingalls. "Artillery Target Practice." "Field Artillery Fire." "Fire Manœuvres of Artillery Masses." Translated from the "Revue d'Artillerie," November, 1892. "Importance of Smokeless Powder." Translation from General Baumgarten's Russian Artillery Professional Notes and Reviews.

Militär-Wochenblatt.—No. 1. "The Criticisms on Prince Frederic Charles," in "Der Volkskrieg au der Loire," Hoenig's New Work, by Colonel Lettow Vorbeck. "Charleston, 1860 to 1865." "Retirement for Age in the French Army." Discussion of articles under this head in "L'Avenir Militaire." No. 2. "Criticisms on Prince Frederic Charles" (*conclusion*). "French Siege Artillery." "Reorganization of the Swiss Army." "New Railways in France." No. 3. "The Defences of Switzerland" "The Infantry Attack," notice of a Russian work by General Skugarewski; worthy of attention. No. 4. "Defences of Switzerland" (*conclusion*). "The Infantry Attack" (*continued*). "Reserve Exercises in France. No. 5. "The Infantry Attack." "Sanitary Regulations for the Navy." "The Drills and Manœuvres of the 2nd and 6th Cavalry Divisions in France, 1893." No. 6. "The Infantry Attack" (*continued*). "New Regulations for Recruiting Service in France." No. 7. "The Shortest way to Constantinople"; review of Stenzel's book. "The Infantry Attack" (*conclusion*). No. 8. "The 1st Cavalry Division at Beaune-la-Roland, 28th November, 1870"; reply to Hoenig's criticism by General von Hartmann, son of the Commander of the Division on that day. "The Bayreuth Dragoons and General Chassot." No. 9. "Reduction of Marching Order Weights in the Infantry."

Jahrbücher für die Deutsche Armee und Marine.—January, 1894. "The events in the War against Danemark, between the 20th January and 7th February, 1864," from the diary of an eyewitness with the 1st (combined) Army Corps. "The Direction and Control of the Manœuvres and Fire of Heavy Artillery in the Attack of Fortified Positions" (by von Speck, Major-General, A.D.). "A Study in the Law of Nations" (by Freiherr von Welck, Lieutenant-Colonel). "Organization and Service of the Russian General Staff." "Military Conditions of the Small German States in the 18th Century" (by Freiherr von Bothmer, Colonel, A.D.). "Troja, 1893" (by von Schröder, Major-General, A.D.). "The German Colonial Troops, their present Organization and Limits of Utility." "The English Fleet Manœuvres in 1893" (by von Henk, Vice-Admiral, A.D.). No. 269. February. "Events in the War with Danemark," from the diary of an officer with the 1st (combined) Army Corps, from the 20th January to 7th February, 1864. "The Direction of the Movements and Control of the Fire of Heavy Artillery in the Attack on Prepared Positions" (by Major-General von Speck). "The German Colonial Troops, their present Organization and Military Value" (*concluded*). "The New Fortifications of Copenhagen" (by H. Frobening). "The French Military Sanitary Services before and after 1870." "Field Flasks and Drinking Cups of Aluminium." "Our Soldiers. Types from Peace and War" (by N. Bukowski), translated from the Russian by Drygalski.

Mittheilungen über Gegenstände des Artillerie- u. Genie-Wesens. — Vienna. "Fundamental Principles of Modern Permanent Fortification" (by von Leithner). "Cast Iron and its Present Position in Building Construction" (by Franz Walter). "Changes in the Equipment of the German Field Artillery," with plates. "Changes in the Russian Artillery," with plates. "Horse-shoes of Aluminium." (See note above.)

Journal des Sciences Militaires.—January, 1894. "Le Régiment de Réserve et la Loi des Cadres" (by General Lewal). "De la Conduite des Retraites et de la Poudre sans fumée." "La Bataille de la Vesles" (*continued*), by Commandant Nigote. "Du Rôle et du Mode d'action probable de l'Infanterie dans une future campagne (*concluded*), by Commandant Walter. "Projet de Règlement de Manœuvres de l'Infanterie." "La Campagne de 1814" (*continued*). "The Cavalry of the Allied Armies" (by Commandant Weil). "La Conception de la Victoire chez les Grands Généraux" (*continued*), by Captain Dervieu.

Revue Militaire de l'Étranger.—"Italian Regulations for Field and Mountain Artillery." "The First Measures of the New Minister of War in Italy." "New Musketry Regulations in the German Army."

Avenir Militaire.—January 2, 1894. "Canal from Wilhelmshaven to Kiel" (see notes above). January 5. "Notice of Exhibits of Steam and Petroleum Road Locomotives," instigated by the "Petit Journal" (January 9). "Recruiting the Colonial Army." "Small-bore Rifles." "To whom shall the Pamirs belong?" "Belgian and Swiss Neutrality" (review of de Mazade's book). January 12. "Tables of Promotion, with leader calling attention to growing favouritism and the supersession of old Officers." "The Troubles of a Company Commander." "Grave Abuses from the Progrès Militaire." 16th January. "The German Artillery in 1894." "Statistical Investigation of the New Bill. Total Force available this year 447 Field, and 47 Horse Batteries." "Correspondence on Promotion Tables." 19th January. "Engineers in Germany, 1894"; increase under the New Army Bill. "Naval Construction in 1893." "Correspondence: Artillery Remounts; complains that Artillery are sacrificed to Cavalry, and urges increase of Establishment sufficient to *insure* six teams always available for instruction." 23rd January. "The German Cavalry in 1894:" alterations under the New Army Bill. "New Regulations on the Fire of Field Artillery in Germany." "Naval Construction in 1893." "The Manœuvres for 1894;" no dates as yet fixed. 26th January. "The German Infantry in 1894:" augmentation under the New Army Bill. "The Naval 'Crise,'" say scare. Clemenceau is warmly attacked with Boulanger and Freycinet; should be read. "New Explosives, 'Schnœbelite.'" "Naval Construction in 1894." 30th January. "The German Army in 1894." "Summing up of previous Articles." Notes that in spite of great increase in men provided by the New Army Bill, no extra charge is incurred for Staff or Generals. "Naval Construction in 1894."

Revue de Cavalerie.—Paris. "The Order Book of a Cavalry Regiment (15th Chasseurs à Cheval) during the Peninsular War, 1812–13." "Regulations, Instructions, and Manœuvres of Cavalry," by an independent pen. "The Armament of Cuirassiers in 1811" (*concluded*). "The Cavalry Manœuvres at Bleré," with map. "Racing in the Army." "The 'Sabretache.'" "Army Museum." The latter an account of the formation of a military archæological museum on the lines of the R.U.S. Museum in England.

Spectateur Militaire.—15th January, 1894. "Marshal Fabert, Samion." "Education of Young Officers," translated from the German by Guymarais. "The Capture of Sfax by General Jamais." "Recollections and Campaigns of Commandant Parquin," by Boissonet. 1st February. "Military Obedience" (by Noel Desmaysons). "Marshal Fabert" (*continued*). "Capture of Sfax" (*continued*). "The Musketeers of the 'Maison du Roi'" (by Boissonet).

Revue d'Artillerie.—Paris. "Experimental Ballistics, Formulæ and Methods" (by Vallier). "Russian Regulations for Field Artillery" (translated and commented by Ollivier and Guieysse). "German Fuses, Time and Percussion Combined; Patterns of 1886, 1888, 1891, and 1892," with plates. "New Organization of the Austro-Hungarian Field Artillery."

Revue du Cercle Militaire.—"Recollections of the Tonkin Expedition." "The New Musketry Instructions in Germany." "Schools of Practical Instruction for Infantry and Cavalry in the Portuguese Army." "The Chilian Army and the Future of Chili" (by a Russian Officer). "Employment of Algerian 'Tirailleurs' in a European Campaign."

Revue Militaire Suisse.—"The Concentration of Troops in 1893" (by a veteran) "Note on Optical Signals" (by Patterat). "Reorganization of the Swiss Army": an interesting paper discussing modifications in the ordinary European type of units entailed by the special conditions in Switzerland.

NOTICES OF BOOKS.

History of India. By H. G. KEENE, C.I.E. 2 volumes. London: W. H. Allen and Co. Price 10*s*.

The very limited space available precludes a notice of even the main divisions of this clear and instructive historical narrative, in which the author, an experienced Indian official and a writer of established reputation, has compressed a vast amount of information into two small volumes.

This epitome of Indian history, "from the earliest times to the present day," is intended for the use of students and colleges; for those who, from want of opportunity or inclination, cannot or will not peruse the ponderous works of Orme, Mill, Elphinstone, Beveridge, Thornton, Malleson, Trotter, and other standard writers. Mr. Keene's views of men and events are characterised by independence of thought and frankness of expression; yet he is temperate in the terms of his praise and blame. In so concise a work, detailed accounts of battles and sieges could not be given, and only those military operations which had important and lasting consequences are recorded. But in the more congenial task of describing the social and political progress of India, the author is more diffuse, and his opinions on these subjects will be read with advantage even where they do not convince.

In dealing with the vexed question of the spelling of Indian proper names, Mr. Keene adopts the reasonable course of retaining those familiar forms "which have taken their place in British history, consecrated by the glory of great deeds or by the pathos of great suffering." Hence we find Plassy, Bhurtpore, Cawnpore, and Lucknow; while in the majority of names, the new, or transliteral, spelling is adopted. But the author is not everywhere consistent, for we have "Mysore" and "Maisur," and even "rupees" and "rupis." The book is worthy of much better maps, and of a far more copious index. In future editions, which will surely be required, we may hope to find these defects supplied.—O'C.

Handbook of British East Africa. London: Harrison and Sons.

The appearance of this book, when the actual condition and glowing prospects of our latest great territorial acquisition are engrossing a large share of attention, may be hailed as singularly opportune. It has been prepared in the Intelligence Division of the War Office by Captain Foster, R.E., and it embodies in a concise form the results of the latest researches and the contents of the most authentic publications.

The main features of our new African dominion, its vast lakes, its snow-clad mountains, its many rivers, its fertile plains, and the various races of its inhabitants, are briefly but plainly described. The existence of the Central African lakes was known for many centuries, and they are shown in the maps in Ogilby's "Africa," published in 1670, and variously placed in those of much older works; but their size and true positions were only determined by recent explorers.

This handbook will be found useful as a work of reference, and when carefully studied with the aid of its excellent maps, will give a clearer impression of its subject than more imposing volumes. There are some errors in figures and some imperfections in diction, but they are unimportant and may be rectified in a future edition.—O'C.

Der Krieg von 1870–71, *dargestellt von Mitkämpfern.* In 6 volumes, small octavo. Price 2*s.* each.

Vol.	I. *Weiszenburg, Woerth, Spicheren.*	Captain TANERA.
„	II. *Beaumont und Sedan.*	
„	III. *An der Loire und Sarthe.*	
„	IV. *Belagerung von Paris.*	
„	V. *In und um Metz.*	Dr. STEINBECK.
„	VI. *Belfort, Dijon, Pontarlier.*	

Erlebnisse eines Würtembergischen Feldsoldaten im Kriege gegen Frankreich 1870–71. KARL GEYER.

Bei den Fahnen des III. Armee Corps von Metz bis Le Mans. Diary of a Company Officer.

Unter Prinz Friedrich Carl. Erlebnisse eines Musketiers vom X. Armee-Corps. Price each 2*s.* 6*d.*, all published by Beck, Munich.

The works mentioned above are all similar in design. They give the personal experiences of the writers in a popular form, and though that form is not always sympathetic to a foreign reader, they may be warmly recommended to students who wish to clothe in flesh and blood the dry bone framework of more strictly military studies.

In the relation of the events of the war, the authors are frequently inaccurate, some, Tanera particularly, have a marked tendency to exaggerate the prowess of their own people, but all, when they come down to the relations of incidents occurring within the range of their personal experience, give, as it were, instantaneous photographs of battle, march, and outpost occurrences, invaluable to the student of modern tactics.

The following extract from Vol. II, "Um und in Metz," by Dr. J. Steinbeck, a one-year volunteer in the IInd Corps, will serve to enable readers to form an opinion of the whole, and we may add that Vol. V, "An der Loire und Sarthe," by Captain Tanera, and the "Diary of a Company Officer," will be found specially useful by students for the coming Staff College Entrance Examination:—

I need not repeat the whole of the story of the march of the corps: in 36 hours, in great heat and over narrow and very indifferent roads, they accomplished 50 English miles, and arrived on the field in rear of Gravelotte in the very nick of time; things being so pressing that Moltke himself rode back to look for them. Their road had lain through Pont à Mousson, and up through the defiles which lead from Gorze to the plateau south of Rezonville. The head of the column had just arrived, and was cooking the coffee when the story commences:—

"We had just succeeded in boiling some water, and were stirring in the coffee; the men were lying around, resting on their packs, when we noticed a stir in front, and a group of the staff galloped down towards us, and in a moment we all recognized 'Von Moltke.' Arrived within 30 yards of us, he halted and asked what division we belonged to, and where was General Fransecky, learning that he was still some way in rear, he told our battalion commander to fall his men in, and march across country to the sound of the guns.

"No time was given us to drink our coffee, though it was the first sup of any kind we had the chance of all day: all was hurry and confusion, the coffee was thrown away and the march began. Our direction took us across the battlefield of the 16th, on which the unburied dead still lay around, and it was by far the most terrible thing I went through in the course of the war. How depressing such a sight must be to troops going into action, can be easily understood, and it was little wonder if our faces grew pale. Many were seized with violent sickness and had to fall out. Then the advantage of the stern discipline of our army showed itself, for though the ranks were often broken by the necessity of going round the heaps of corpses and dead horses, they closed in immediately, and even those who had been

compelled to fall out, ran after and rejoined their comrades—driven on as much by the scorn of the others as their own good feelings. And how ghastly the sight was! For two whole days, in the burning sun, the dead had lain around and decomposition had already set in. For three terrible miles we stumbled through them; it seemed an eternity; at last it came to an end, and we were again in the open field.

"'Battalion halt!'—'Take off your knapsacks.' The command was obeyed with a sigh of relief. The casing was taken off the colours, and they were unfurled—that meant that we were in for it; but we were still in a hollow; and though the uninterrupted roar of the firing was close at hand, we could see nothing.

"At last came the signal to advance, we reached the top of the ridge, and before us lay the overpowering picture of a great battle, and in one moment our previous toils and pains, our anxiety and terrors, were forgotten. In front of us lay the ravine of the Mance, and beyond on the plateau, which dipped gently towards us, we could distinguish the French troops in movement at points where the veil of smoke broke for a moment. Holding on to the further edge of the ravine, we could see crowds of our own men (belonging, we afterwards learnt, to the VIIth and VIIIth Corps); and now suddenly, it was about 7 P.M., and the sun was just beginning to go down, the French dashed forward to a terrific counter-attack; and before it we saw the whole of our line give way and stream back in disorder. The French batteries galloped through their men, and, unlimbering on the very edge of the ravine, sent their shells shrieking towards and beyond us; and at the same moment our Corps Artillery, which had just arrived, returned their fire. Here we stood motionless, at attention, whilst the shells screamed over our heads. The spectacle was so grand, so exciting, that it absorbed all our faculties, and, for the moment, speaking for myself, I felt carried away from all earthly surroundings, and unconscious that I had a body to be killed or maimed—a feeling which I have never experienced since when under fire. Indeed, on more than one subsequent occasion, I frankly confess I have felt very conscious of the vulnerability of my fleshy envelope indeed.

"The last rays of the setting sun, slanting across the valley, enabled our gunners to choose their targets with terrible distinctness, whilst, fortunately for us, it is full in the Frenchman's eyes; and now at last comes the order to 'advance,' and in a few minutes we are well within the reach of the Chassepot bullets, which fall literally like hail. Down in the ravine the confusion in the growing darkness is appalling; the stream bed is rocky; and all those who can crawl have dragged themselves down to drink and die. Fortunately we are still in column: for all at once the regiment in front, which had held on to its position longest, gives way before a renewed impulse from the French, and the whole line sweeps back upon us, luckily without being followed up. In spite of the column, the confusion spreads to our ranks. I work my way forward towards the colours, where I knock up against my captain, who grins at me approvingly. It has suddenly grown dark, indeed very dark, and all at once from close at hand a tremendous fire is opened on us. Is it from friend or foe? Unluckily it proved to be the former, as we afterwards found out; but not knowing that at the time, we replied to it smartly, and then—how or where did it begin—first one, then a couple, presently a group, at last the whole battalion gave way and drifted backwards. The moment was critical, every one who kept his senses tried to make the men halt: a bugler was found and ordered to sound the 'advance,' but in his terror he sounded the 'retreat,' and made matters worse. Already we had reached the bottom of the valley, when the voice and example of our brave battalion adjutant saved us. With his sword in one hand and the colours in the other, he forced his way through to the front, and fixing the colours in the ground, called on the men, with a voice distinctly heard above the awful din, to rally to him. The flag stood, and with it the battalion for a few moments, almost in silence, and as if the men were ashamed of their conduct. Then, with a thundering 'hurra,' without any word of command, the whole dashed forward together, and this time there is no one to stop us. The enemy is in full retreat; here and there firing is still going on, and the plateau is lit up by the flames of the burning farmhouses. After a time our officers succeed in rallying us to a certain extent, we halt and pile arms; and too weary to look round, and see

who is missing, too done even to remember our hunger, we fall asleep on the ground we have conquered. Suddenly a volley crashes out to our front, and the bullets fall right into our sleeping battalion. The confusion which follows is indescribable: those not severely hit, spring for their arms to the piles, knocking them over in so doing; the others, not finding theirs, simply turn tail and bolt for the hollow; but discipline gets the better even of those, and one by one they creep forward to find their rifles. Thus all order is lost, and as it is with us, so it seems to be all along the line. With some 15 others, I wander about, looking for the colours, and meeting men of every other regiment in the army doing the same. In the distance we hear bugles and commands, but cannot make them out. We had just decided to lie down just where we were and wait for day, when we heard a strong determined voice calling to us 'Who commands here?' and the next moment I recognised our Divisional General. Answering for my comrades, I replied, 'No one, sir.' 'Well,' said he, 'I want a dozen determined men, are you such?' 'We hope so, sir.' 'Right, then,' he continued. 'Fall your men in, in single rank, three paces apart, rifles ready, and pointing there. Now, I am going to take command of you for the night. If this row begins again, let the stragglers all pass over you, and do not fire till you see the red trowsers, and then not without my command.'

"All night long we lay as he had directed, cheered up, and kept awake by a word now and again from our General, who stayed close to us, rallying the stragglers and continuing our line, till by daytime he had evolved something like order from chaos, and if the French had attacked again, we would have been able to give them a tolerable reception."

Die Entwicklung der Feld-Artillerie in Bezug auf Material, Organisation und Taktik von 1815—1892. Von H. MÜLLER, General Lieutenant, z.D. Berlin: 1893. Mittler.

This book is of special interest to the student of the evolution of the Prussian army. It marks well the utter stagnation which reigned from 1815 until the influence of Moltke and King William began to assert itself.

In 1855 the ages of the Battery Commanders varied between the limits of 53 and 56, those of the Colonels from 56 to 61. Given these figures, the length of time required to secure the introduction of the rifled gun is no longer difficult to understand. So conservative of its traditions was the arm, that even in 1869 and 1870 articles were published in essays, and the "Allgemeiner Militär Zeitung," in favour of the smooth-bore, at least for the horse artillery.

The author shows himself but little acquainted with the evolution of the arm in England. "The question was left in the hands of civilian contractors," he says, "and the hollowness of Lord Herbert's boast, on the 14th February, 1861, in the House of Lords, that the 'British artillery had the best guns in the world,' was soon exposed." Yet, as a fact, years after, at Shoeburyness, in 1869, if we remember rightly, the 12-pr. Armstrong of that date conclusively demonstrated its all-round superiority over the Krupp, with which the Germans fought the French in 1870. He has also completely misunderstood the causes which led to our readoption of the muzzle-loader. "The metal would not stand the damp climate of India," is his explanation, and elsewhere he states that the Armstrong guns were constructed of "cast steel"!

The second volume, dealing with events from 1870 to the present day, is more satisfactory, and based on the documents placed at his disposal by the office of the Inspector-General of Artillery at Berlin; its accuracy is above suspicion.

The tactical section is very interesting, but it is tantalizing to find no reference to those essential points on which the present efficiency of the arm is based, viz., training and preparation of horses for long marches, ranging, and fire discipline, hardly touched upon. The information under the head of high explosive bursting charges is also disappointing, very much at variance from the testimony of eye-witnesses. Read with the Regulations of the German Army at hand to refer to, the specialist will find enough in it to justify its existence.

Darf Russland einen Angriff auf den Bosphorus wagen? "Dare Russia risk a *coup de main* on the Bosphorus?" A military-political study. By F. Vienna: 1892. Crown 8vo. 3 maps.

This work deserves wider publicity in England than it has at present secured. Based on the assumption that France would maintain a neutral attitude with a slight leaning towards Russia only, now that the Franco-Russian alliance has become an accomplished fact, every argument in it is intensified fourfold.

The author gives tabular statements of the vessels and railways available to Turkey and Russia respectively, and on the bases supplied by the experimental embarkation manœuvres in the Black Sea in 1885, calculates the number of troops which could be conveyed in each trip. The net result of these experiments was that for every 1,000 men of a field army, including 3 guns, staffs, horses, train, &c., 3,000 tons were required. According to the author, success turns on the seizure and obstruction of the Bosphorus by floating booms, nets, mines, &c., before the Turkish fleet could develop its numerical superiority, and those best informed of the condition of that fleet will not be disposed to reduce his estimate.

Given a week's time, and not even the British fleet, unsupported by a field army, could force the ingenious boom he describes, which depends for its properties of resistance on the fact that no ebb and flow of the tide has to be allowed for.

The ultimate result now turns, first on the degree of resistance the troops first landed could oppose to the Turks, and then on the relative rapidity with which fresh ones could be fed up.

The original expeditionary corps he takes at 20,000, increased by the end of the first week to 70,000, against which the Turks can bring 97,500.

2nd week,	145,000	Russians,	against	148,500	Turks.	
3rd	„	232,500	„	„	202,000	„
4th	„	320,000	„	„	252,000	„
5th	„	407,500	„	„	280,000	„
6th	„	495,000	„	„	320,000	„

It is tolerably evident, therefore, that only England's timely help could avert disaster. The author's opinion is that, even with the best will in the world, we should come too late; and if this was true in 1892, when we had not the active opposition of France to encounter, how much more so now, after the Toulon alliance.

Reviewing the whole political situation, the author is inclined to believe that Russia and France will purchase a free hand in Egypt and the East from the Triple Alliance, by the cession of Poland up to the Vistula, and the renunciation of all claim to Alsace-Lorraine. Those best acquainted with the need of the central governments for peace—greater far now than in 1892—will form their own opinions whether such an offer might prove acceptable or not.

Geschichte der Nord Armee im Jahre 1813. Von Barthold von Quisdorp, Lieut.-General. 3 vols. with maps. Price 35*s*. Berlin: Mittler.

This work, undertaken under the superintendence of the General Staff, was commenced by von Ollech, the well-known historian of the Waterloo campaign. On his transference from the historical section, it was continued by the Staff, up to the battle of Dennewitz, when for a time it was allowed to remain in abeyance; it was then resumed, and completed by General von Quisdorp, who has had access to all the archives in the staff offices. General von Quisdorp is well known amongst the inner circle of historical experts at Berlin as a most careful and conscientious worker, and in the present book he has brought to light many facts of the utmost importance, both to the political historian and to the student of the evolution of our present tactical methods. To some of these we hope to refer at greater length in a subsequent number.

Reminiscences of the Great Mutiny, 1857-59; including the Relief and Siege of Lucknow, the Campaigns in Rohilkund and Oude. By WILLIAM FORBES MITCHELL, late Sergeant 93rd Sutherland Highlanders. Macmillan. London: Crown 8vo. 8*s.* 6*d.* nett.

The literary value of this work has been sufficiently attested by the notices in the daily press, but the book possesses a military value entirely its own. The men and officers who took part in the Mutiny are now rapidly passing away from the regiments, and it is becoming increasingly difficult for the young officer to learn what actually happened during that period. In a few years the memory of those days will become legendary, and no reliable record either of what was done or left undone, or of what a British regiment might and did become under the conditions for which its system was designed, viz., continuous active service, will remain with us. This book will give the future historian exactly the evidence he will require; in its pages he will find portrayed with photographic accuracy the men who made the regiments—what they were, what they said, and how they fought. Of what surpassing interest would similar works from the days of Marlborough or of Sir John Moore at Shorncliffe be to students of tactical evolution nowadays.

Memories of the Mutiny. By FRANCIS CORNWALLIS MAUDE, V.C., C.B., with which is incorporated the personal narrative of John Walter Sherer, Esq. Remington and Co.

Only yields in interest to the above because it treats of matters from the officer's standpoint, with which we are all more or less familiar. What the men say and think is often more interesting.

A King's Hussar. By HERBERT COMPTON. Cassell. London. Price 6*s.*

This book will also prove an important link in the chain of evidence in the reconstruction of the old regiments by the future historian, for it shows up clearly to those who can read between the lines the strong and weak points of the old system.

LIST OF RECENT FOREIGN BOOKS.

Principes de Dressage et d'Equitation. Par JAMES FILLIS. Flammarion. Paris, 1892. Price 15*s.*

L'Europe et les Neutralités. La Belgique et la Suisse. Par CH. DE MAZADE. 317 pp. in 12mo. Plon. Paris.

L'Escrime Pratique. AMBROISE BAUDRY. 101, Rue de Richelieu, Paris. Price 8*s.*

Le Cheval soins Pratiques. Par M. DE COMMINGES. Paris: Legoupy, 1893. 1 vol. in 16mo. 5fr.

Un Corsaire Anglais (batailles imaginaire). Guerre entre la France et l'Angleterre en 189 . Par A. GARCON. Paris: Charles Lavouzelle.

Locomotive Engine Running and Management. By ANGUS SINCLAIR. Wiley and Sons. New York and at Spons. London, 1892. Price 8*s.* 6*d.*

Well worth the attention of passengers inclined to grumble at the unpunctuality of railway trains, and invaluable to staff officers in charge of railway operations, showing them how to avoid demanding impossibilities from the railway people.

Wie ist die Beizaümung des Pferdes zu Gewinnen und zu Erhallen. By PAUL PLINZNER. Berlin: Mittler, 1893. Plinzner is responsible for the training of his

Imperial Majesty the German Emperor's riding horses. We have seen him at work, and can warmly recommend anything from his pen. Instantaneous photos. render the text intelligible.

Friedrich der Grosse und General Chassot (from hitherto unpublished MSS.). By KARL THEODOR GAEDERTZ. Bremen, 1893.

Readers of Carlyle will recall Chassot and his first meeting with the Crown Prince at the siege of Philipsburg. Chassot served with great distinction at Mollwitz, and subsequently in the celebrated Bayreuth Dragoons, which regiment he claims to have led at Hohenfriedburg in the celebrated charge which resulted in the practical destruction of the Austrian infantry and the capture of 66 stand of colours. To this statement the "Militär-Wochenblatt" lodges an objection on indisputable evidence from the regimental records, but in spite of this inaccuracy admits the claim of the book to be classed as an original source for the student of the period.

Friedrich's des Grossen Angriffs pläne gegen Oesterreich im Siebenjährigen Kriegs. Von Dr. ALBERT NAUDÉ. Marburg, in Hessen, 1893. A polemical dissertation on Bernhardi and Delbrück.

Armée Eintheilung und Quartierliste des Deutschen Reichsheeres und der Kaiserlichen Marine 1894. Tabular statement corrected up to 15th October, 1893. By GERSTMANN. Berlin.

Seidel's kleines Armée Schema. Dislocation und Eintheilung des k.k. Heeres, der k.k. Kriegs Marine und der kön. ung. Landwehr. Corrected to 1st November, 1893. Vienna. Seidel and Sohn.

Ocean Steamships. London: John Murray. Price 22*s.* 6*d.*

A handsomely-bound collection of papers on our great ocean steamer lines, which originally appeared in "Harper." The book is beautifully illustrated, and contains just that degree of information in untechnical language which every steamship passenger, judging by his questions to the captain and officers of the ship, dearly desires to possess.

Steam Yachts and Launches: their Machinery and Management. By C. P. KUNHARDT. 8vo. Cloth. Price 15*s.* Spon, 125, Strand.

Steamships.—By J. W. C. HALDANE. With 100 plates, &c. Spon, London. Price 15*s.*

Infantry Fire: its use in Battle. By J. B. BATCHELOR, Lieutenant 24th U.S. Infantry. G. A. Spooner, Leavenworth, Kansas.

Jahresbericht über die Leistungen und Fortschritte auf dem Gebiete des Militair Sanitäts Wesens. Von Dr. WILHELM ROTH. Berlin: Mittler, 1892.

A most valuable summary of work done and results obtained in the domain of military surgery and hygiene. With regard to modern small-bore bullets the tendency is most reassuring to those who may possibly have to serve as targets for them. The notes on influenza and cholera are also interesting.

To be obtained through Messrs. Stanford, Cockspur-street, London:—

Rules of Procedure. 1893. Price 1*s.*

Fire Discipline: its Foundation and Application. By Lieutenant STEWARD MURRAY. Price 2*s.*

The Organization and Tactical use of Cavalry, Artillery, and Infantry. By Colonel C. L. HARVEY. Price 1*s.* 6*d.*

General List and Index of Army Regulations in force on January 1, 1894. Price 1*s.*

Captain Alston's "Seamanship." 3rd Edition. Revised and enlarged by Commander T. P. WALKER, R.N. Price 10*s.* 6*d.*

Order Book for Executive Officers of the Royal Navy. Compiled by Commander W. W. HEWETT, R.N. Price 3*s.*

The Private Life of Napoleon. Translated from the French of Arthur Levy. 2 vols. Price 28*s.*

Catalogue of English Official Military Works published by the British Government. London, 1894. Price 6*d.*

LIST OF THE ARMY REGULATIONS AND INSTRUCTIONS IN FORCE ON THE 1ST JANUARY, 1894.

	Promulgated by		
	Army Circular or Army Order.	Clause or number.	Year.
Academy, Royal Military, Regulations	A.O.	191	1893
†Allowance Regulations	A.O.	174	1893
Armourers, Instructions for, in Care, Repair, Browning, &c., of Arms, &c.	A.O.	196	1892
Army Circulars:—			
Up to 31st December, 1882, reprint	A.O.	252	1889
From 1st January, 1883, to 31st December, 1887.			
Army Orders, from the 1st January, 1888.			
Army Reserve Regulations	A.O.	29	1893
Army Service Corps, Drills and Exercises, Book of	A.O.	192	1891
" " Duties, Regulations.. ..	A.O.	192	1893
* " " Manual for Field Service ..	A.O.	399	1889
* " " Standing Orders	A.O.	378	1890
*Artillery Company, Honourable, Regulations for	A.O.	477	1889
" Field, Drill	A.O.	176	1893
" Garrison, Drill, Vol. II.	A.O.	52	1891
" " " Vol. I.	A.O.	27	1893
* " Manual for Field Service	A.O.	14	1889
" Mountain, Drill	..	..	1891
" Siege, Drill	A.O.	76	1891
" Standing Orders	A.O.	12	1894
Barrack Furniture, Schedules	A.O.	90	1889
*Bearer Companies and Field Hospitals, Manual for Field Service	A.O.	481	1888
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